

Dashboard Manual Librarians

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PORTICO

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Introduction

The Portico Dashboard is a tool for Portico staff, Portico publishers, and Portico libraries to monitor the preservation process and status of content being preserved at Portico. Each entity, Portico staff, publishers, and libraries have their own “view” of the Dashboard. Librarians may see the overall status of all participating publishers, but will only be able to review individual items within the preservation services in which their library participates (e.g., if your library only supports e-book preservation, you may not review individual books). Publishers may review any content they provided.

The Dashboard can be used to look up all sorts of information about content preserved in Portico, for example:

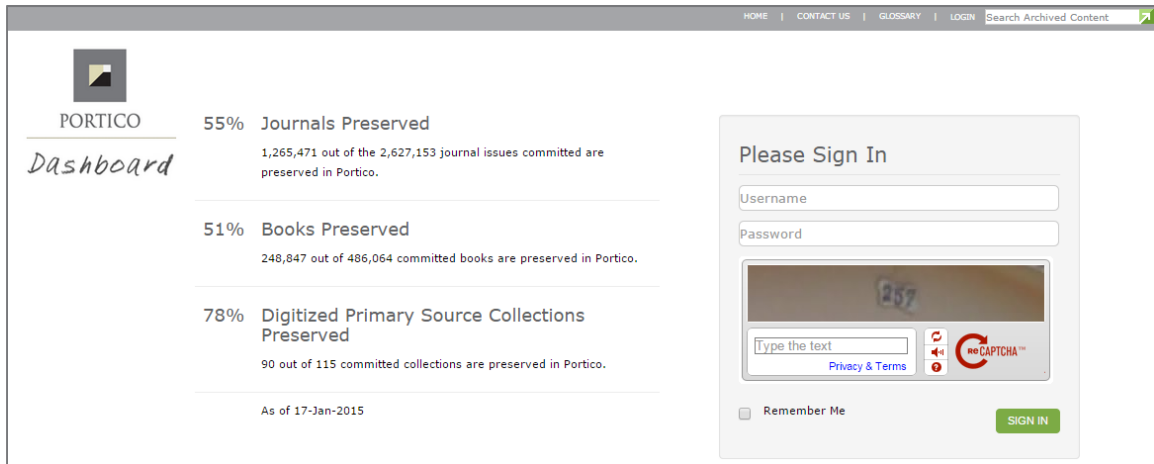
- the last time content was received and run for a publisher
- a list of articles matching a DOI
- hot linked DOIs within articles for easy access to the content at the publisher’s website
- easy access to the article XML and PMD (preservation metadata) files

This guide has the following sections:

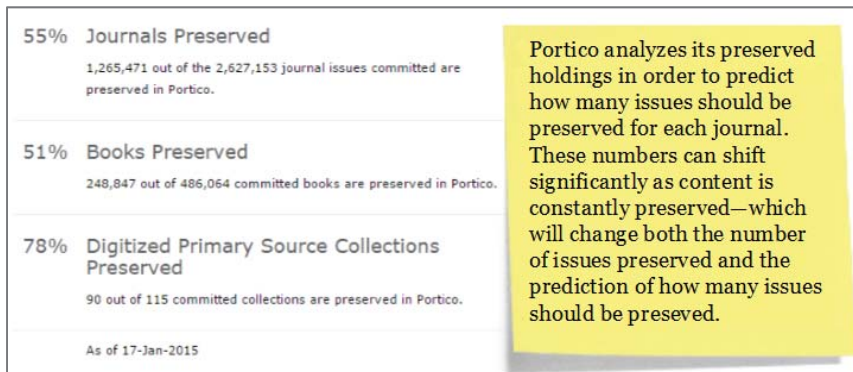
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Accessing the Dashboard

The Dashboard is accessed at: <http://audit.portico.org>



The log-in the form will be on the right side of the page or, on a narrow monitor, at the bottom of the page. On the left side of the page are high level numbers that show the completeness of the entirety of the Portico Archive (these numbers reflect Portico's status in regard to all committed content).



Journal List Page

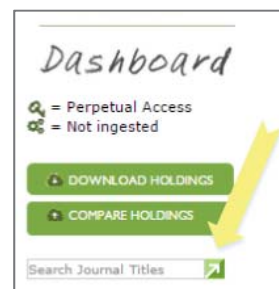
Upon logging in, librarians will be taken to a list of all journal committed to Portico. Journals with content preserved in Portico will be hot links. Journal without any content preserved yet, will have a “Not ingested” icon to the left.

The screenshot shows the Portico dashboard with a list of journals. The list is sorted alphabetically by journal name. Each row includes a journal title, its ISSN, and its publisher. A yellow callout box highlights that the list is sorted alphabetically and provides the journal name, ISSN, and publisher, along with information on whether the title is covered by post-cancellation access in Portico and whether the title yet has content preserved in Portico.

Journal	ISSN	Publisher
III-Vs Review	09611290	Elsevier
3C ON-LINE	10782192	Association for Computing Machinery
3DTV Conference: The True Vision - Capture, Transmission and Display of 3D Video (3DTV-CON)	21612021	IEEE, Inc.
4QR	16142411, 16194500	Springer
19th-Century Music	01482076, 15338606	University of California Press
21st Century Society: Journal of the Academy of Social Sciences	17450152, 17450144	Taylor & Francis Group
24 Images	07079389, 19235097	Consortium Érudit
AORN Journal	00012092	Elsevier
A Life in the Day	13666282	Emerald Group Publishing
A&A Case Reports	23257237	Wolters Kluwer Health
A.M.A. Journal of Diseases of Children	00966916, 15383628	American Medical Association
a/b: Auto/Biography Studies	21517290, 08989575	Project MUSE
AACN Advanced Critical Care	15597768	Wolters Kluwer Health
AACN Clinical Issues in Critical Care Nursing	10467467	Wolters Kluwer Health
AACN Clinical Issues: Advanced Practice in Acute and Critical Care	10790713	Wolters Kluwer Health
AADE in Practice	23251611, 23251603	SAGE Publications
AAOHN Journal	08910162	SLACK, Inc
AASRI Procedia	22126716	Elsevier
Ab Imperio	21664072, 21649731	Project MUSE
Abacus	14676281, 00013072	John Wiley & Sons

Find a Specific Title

One of the most useful features of the journal list page is the ability to look up a journal title by any of the words in the title or by any of the ISSN. This tool is located in the left hand navigation bar on the page. For example, below are the results from a search on the word “pulmonology”.



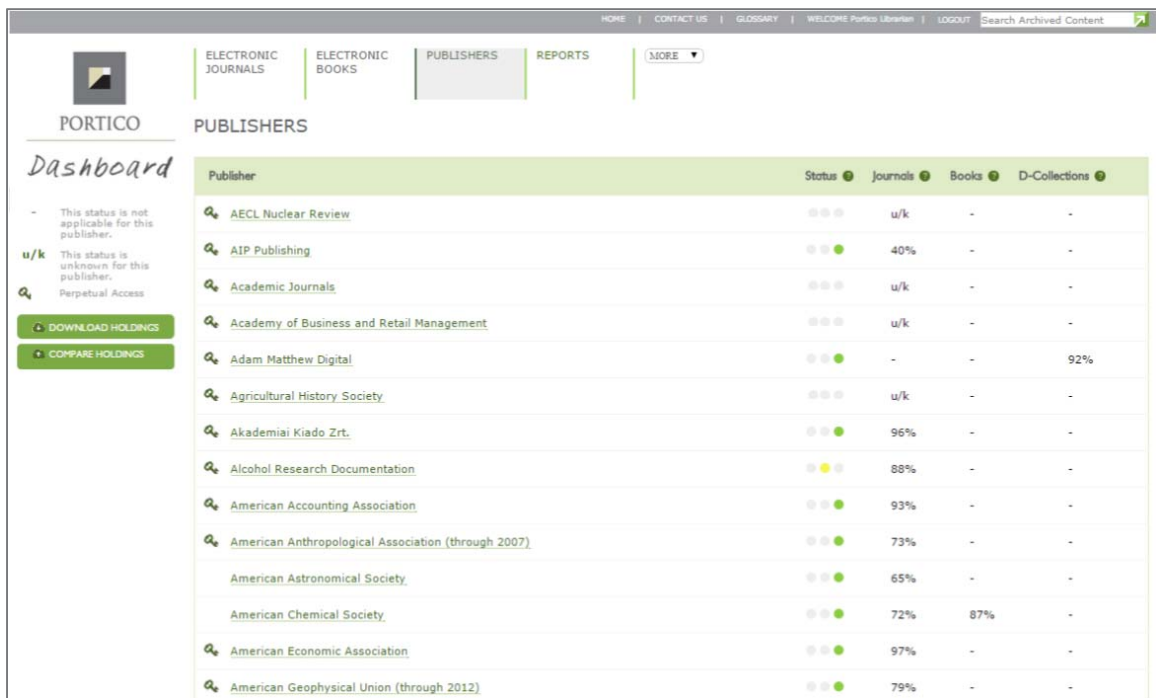
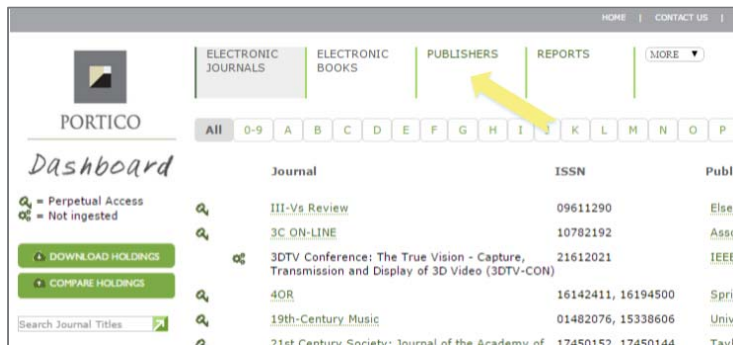
The results include a list of only those journal titles within Portico that contain the word “pulmonology”.

A screenshot of the Portico search results page. The page has a navigation bar at the top with links for HOME, CONTACT US, GLOSSARY, WELCOME Portico Librarian, LOGOUT, and Search Archived Content. Below the navigation bar, there are tabs for ELECTRONIC JOURNALS, ELECTRONIC BOOKS, PUBLISHERS, REPORTS, and MORE. A search bar at the top left contains the word "pulmonary". Below the search bar, there is a "Dashboard" section with icons for Perpetual Access and Not ingested, and buttons for DOWNLOAD HOLDINGS and COMPARE HOLDINGS. The main content area is a table with columns for Journal, ISSN, and Publisher. The table lists several journals related to pulmonary medicine.

Journal	ISSN	Publisher
BMC Pulmonary Medicine	14712466	BioMed Central
Cardiopulmonary Physical Therapy Journal	15417891	Wolters Kluwer Health
Clinical Pulmonary Medicine	10680640	Wolters Kluwer Health
COPD: Journal of Chronic Obstructive Pulmonary Disease	15412563, 15412555	Informa Healthcare
Current Opinion in Pulmonary Medicine	10705287, 15316971	Wolters Kluwer Health
Journal of Aerosol Medicine and Pulmonary Drug Delivery	19412711, 19412703	Mary Ann Liebert, Inc.
Journal of Cardiopulmonary Rehabilitation and Prevention	1932751X, 19327501	Wolters Kluwer Health
Pulmonary Circulation	20458940, 20458932	Medknow Publications and Media
Pulmonary Medicine	20901844, 20901836	Hindawi Publishing Corporation
Pulmonary Pharmacology	09520600	Elsevier
Pulmonary Pharmacology & Therapeutics	10945539	Elsevier

List of Publishers Page

Many times, you may want to review content for a specific publisher or evaluate the current state of a publisher. The most useful set of pages for these actions are the publisher pages. Selecting the “Publishers” tab at the very top menu, will take you to a list of publishers committed to preserve content with Portico.



Publishers Page—Status

The status is calculated by evaluating the number of journals preserved, the number of issues preserved, the number of books preserved, the number of collections preserved, and the percentage of content that is difficult to process.

Publisher	Status	Journals	Books	D-Collections
AECL Nuclear Review	●●●●	u/k	-	-
AIP Publishing	●●●●	40%	-	-
Academic Journals	●●●●	u/k	-	-
Academy of Business and Retail Management	●●●●	u/k	-	-
Adam Matthew Digital	●●●●	-	-	92%
Agricultural History Society	●●●●	u/k	-	-
Akademiai Kiado Zrt.	●●●●	96%	-	-
Alcohol Research Documentation	●●●●	88%	-	-
American Accounting Association	●●●●	93%	-	-
American Anthropological Association (through 2007)	●●●●	73%	-	-
American Astronomical Society	●●●●	65%	-	-
American Chemical Society	●●●●	72%	87%	-
American Economic Association	●●●●	97%	-	-
American Geophysical Union (through 2012)	●●●●	79%	-	-

Publishers Page—Journals, Books, and D-Collections

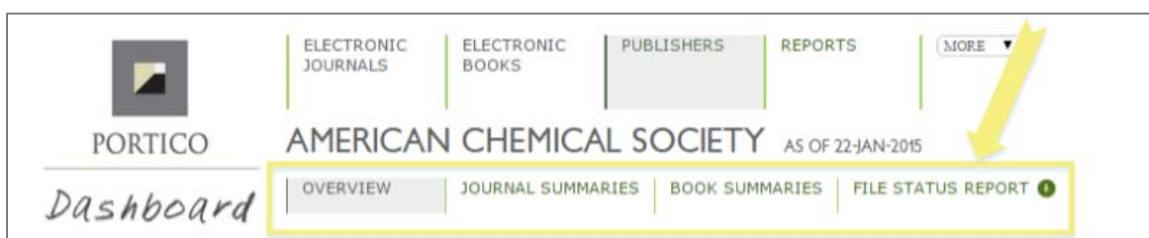
The percentages here are:

- the percentage of predicted issues which are preserved
- the percentage of unique books preserved compared to the number of books committed to Portico
- the percentage of collections committed to Portico that are preserved.

Publisher	Status	Journals	Books	D-Collections
AECL Nuclear Review	●●●●	-	-	-
AIP Publishing	●●●●	40%	-	-
Academic Journals	●●●●	u/k	-	-
Academy of Business and Retail Management	●●●●	u/k	-	-
Adam Matthew Digital	●●●●	-	-	92%
Agricultural History Society	●●●●	u/k	-	-
Akademiai Kiado Zrt.	●●●●	96%	-	-
Alcohol Research Documentation	●●●●	88%	-	-
American Accounting Association	●●●●	93%	-	-
American Anthropological Association (through 2007)	●●●●	73%	-	-
American Astronomical Society	●●●●	65%	-	-
American Chemical Society	●●●●	72%	87%	-
American Economic Association	●●●●	97%	-	-
American Geophysical Union (through 2012)	●●●●	79%	-	-

Individual Publisher Page

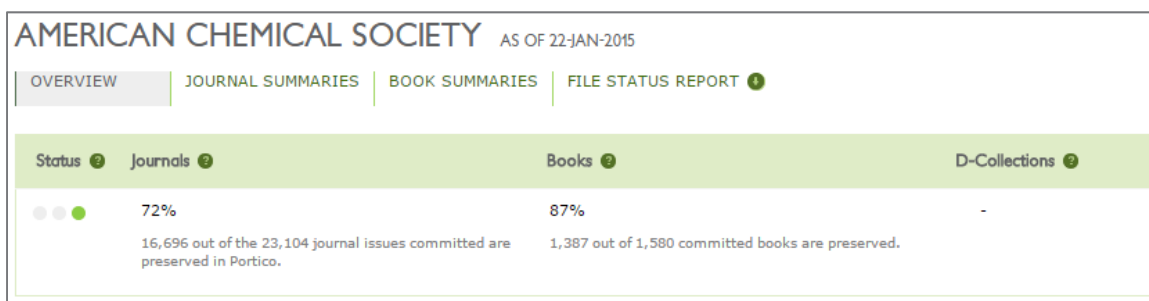
The publisher pages have much information on them and can be gotten to by clicking on any hot linked publisher name from anywhere in the Dashboard or audit interface. At the very top of any publisher page, there are a series of links or “tabs” that will allow you to view different information about the status of the publisher’s content.



- **Overview:** The tab you land on when you select any particular publisher.
- **Journal Summaries:** A list of the committed journals for this publisher with start and ending volume information for the content in the Portico archive.
- **Book Summaries:** A list of the preserved books for this publisher.
- **File Status Report:** A listing of all the file formats in this publisher’s content and their status.

Individual Publisher Page—Overview

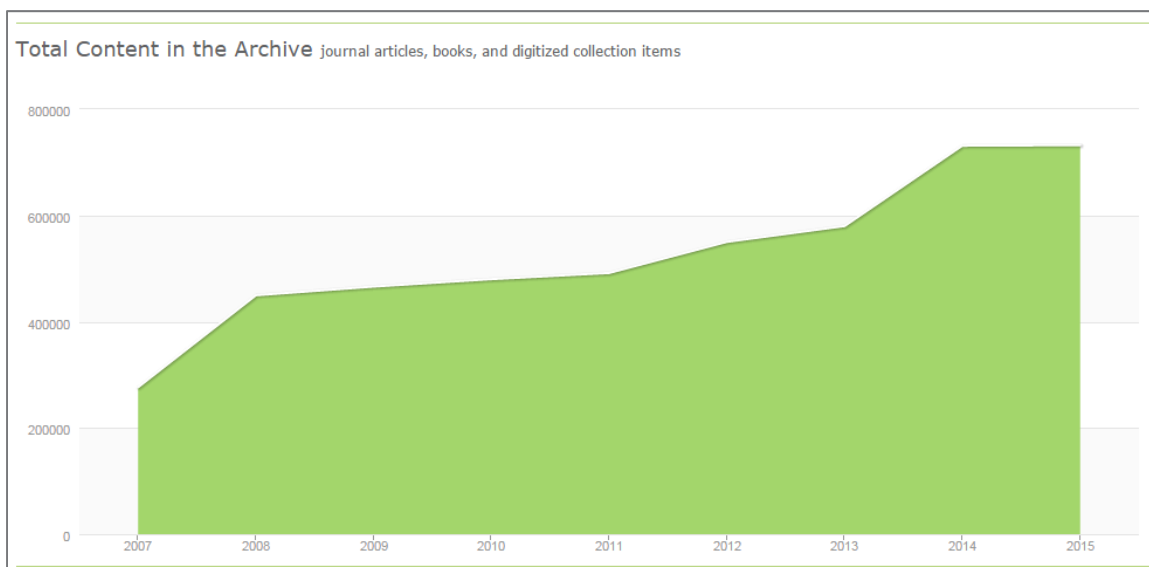
The overview tab on the publisher page has multiple sections. The very top section includes the same set of numbers that were seen on the list of publishers page.



In the Journals column, the percentage is the number of journal issues preserved by Portico divided by the number of issues Portico expects to receive, based on an analysis of the content Portico has preserved (see section below on

E-Journal Completeness Report for a deeper explanation of this analysis). In the Books column, the percentage is the number of unique books preserved by Portico divided by the number of books committed to Portico by this publisher. For a publisher participating in the D-Collections preservation service, the percentage would be the number of collections preserved divided by the number of collections committed to Portico.

The next chart shows the total amount of content preserved in the Portico archive for that publisher (this includes any journals, books or d-collection items preserved for the publisher) at different moments in time. Below we can see that American Chemical Society content was first preserved in 2007 and that Portico is now preserving more than double the number of articles preserved in 2007.



The next slot on the tab is a statistical overview of the publisher. These are counts of the number of journals, volumes, issues, articles, and books have been preserved for this publisher.

Journals	Journals Preserved	54
	Volumes Preserved	1,345
	Issues Preserved	16,696
	Articles Preserved	730,626
Books	Books Preserved	1,387

The final section of the tab is an overview of the last time content for this publisher was received by Portico, loaded into the content processing system, and preserved.

Date last content received	22-Jan-2015
Date last content loaded	24-Dec-2014
Date last content preserved	8-Jan-2015

Individual Publisher Page—Journal Summaries

The Journal Summaries tab lists all of the titles committed to Portico by this publisher and includes identifying and holdings information for each. Note that the “start” and “end” information in this chart is simply a reflection of the content preserved in Portico—the publication may begin earlier than the Portico start information and run longer than the Portico end information.

AMERICAN CHEMICAL SOCIETY AS OF 22-JAN-2015								Download Publisher Journal Holdings
OVERVIEW	JOURNAL SUMMARIES	BOOK SUMMARIES	FILE STATUS REPORT					
Title	ISSN	Start Year	Start Volume	Start Issue	End Year	End Volume	End Issue	Completeness Report
Accounts of Chemical Research	00014842, 15204898	1968	1	1	2014	47	9	VIEW
ACS Applied Materials and Interfaces	19448252, 19448244	2008	1	1	2014	6	23	VIEW
ACS Biomaterials Science & Engineering	23739878	0			0			
ACS Catalysis	21555435	2010	1	2	2014	4	12	VIEW
ACS Central Science	23747951	0			0			
ACS Chemical Biology	15548937, 15548929	2008	4	1	2014	9	9	VIEW
ACS Chemical Neuroscience	19487193	2010	1	7	2014	5	9	VIEW
ACS Combinatorial Science	21568944, 21568952	2010	13	1	2014	16	12	VIEW
ACS Infectious Diseases	23738227	0			0			
ACS Macro Letters	21611653	2012	1	1	2014	3	9	VIEW
ACS Medicinal Chemistry Letters	19485875	2010	1	6	2014	5	12	VIEW
ACS Nano	19360851, 1936086X	2008	2	5	2014	8	11	VIEW
ACS Photonics	23304022	0			0			
ACS Sustainable Chemistry and Engineering	21680485	0			0			
ACS Synthetic Biology	21615063	2011	1	1	2014	3	11	VIEW
Analytical Chemistry	00032700, 15206882	1947	19	1	2014	86	23	VIEW
Biochemistry	00062960, 15204995	1962	1	1	8204	53	48	VIEW
Bioconjugate Chemistry	10431802, 15204812	1990	1	1	2014	25	9	VIEW

Individual Publisher Page—Book Summaries

The Book Summaries tab lists all of the books preserved for this publisher (note that as of early 2015, this is just the list of books preserved and does not include books that have been committed by the publisher, but not yet preserved).

AMERICAN CHEMICAL SOCIETY AS OF 22-JAN-2015 Download Publisher
Journal Holdings

OVERVIEW | JOURNAL SUMMARIES | **BOOK SUMMARIES** | FILE STATUS REPORT

Title

100+ Years of Plastics. Leo Baekeland and Beyond
E. Thomas Strom, Seth C. Rasmussen(2011)
DOI: 10.1021/bk-2011-1080
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd5jg54b6
PDFs | HTML | Preservation Information | Tree View | PMD | XML

A Festival of Chemistry Entertainments
Jack Stocker, Natalie Foster(2013)
DOI: 10.1021/bk-2013-1153
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd12nw9d2j
PDFs | HTML | Preservation Information | Tree View | PMD | XML

A Festival of Chemistry Entertainments
Jack Stocker, Natalie Foster(2013)
DOI: 10.1021/bk-2013-1153
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd12nw4nhx
PDFs | HTML | Preservation Information | Tree View | PMD | XML

A Key to PHARMACEUTICAL AND MEDICINAL CHEMISTRY LITERATURE
unattributed(January 01, 1956)
DOI: 10.1021/ba-1956-0016
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd984x3hc
Table of Contents | Additional Information | PDFs | Preservation Information | Tree View | PMD | XML

Actinide Separations
James D. Navratil, Wallace W. Schulz(April 16, 1980)
DOI: 10.1021/bk-1980-0117
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd5hndvsw
Table of Contents | Additional Information | PDFs | Preservation Information | Tree View | PMD | XML

Actinide Separations
James D. Navratil, Wallace W. Schulz(April 16, 1980)
DOI: 10.1021/bk-1980-0117
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd5hndxzf
Table of Contents | Additional Information | PDFs | Preservation Information | Tree View | PMD | XML

Actinides in the Environment
Arnold M. Friedman(June 01, 1976)
DOI: 10.1021/bk-1976-0035
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd5hkdzz3
Table of Contents | Additional Information | PDFs | Preservation Information | Tree View | PMD | XML

Activation and Functionalization of C—H Bonds
Karen I. Goldberg, Alan S. Goldman(July 12, 2004)
DOI: 10.1021/bk-2004-0885
Portico Content Set: ACS E-Books
Portico Item ID: ark:/27927/pbd5j8hjd1
Table of Contents | Additional Information | PDFs | Preservation Information | Tree View | PMD | XML

Individual Publisher Page—File Status Report

The file status report tab is straightforward. It is a list of all the file formats found in this publisher's content and the number of files in that format in the statuses which Portico tracks.

AMERICAN CHEMICAL SOCIETY AS OF 22:JAN-2015 Download Publisher Journal Holdings					
OVERVIEW JOURNAL SUMMARIES BOOK SUMMARIES FILE STATUS REPORT 1					
Format	Not Well Formed	Well Formed and Not Valid	Well Formed and Valid	Not Determined	Grand Total
ACS Atypom ACHS NLM Journal Archiving and Interchange DTD:2.2:2006-04-30	0	106	171,342	0	171,448
ACS Atypom Book DTD:2.3:2009-08-07	0	0	44,355	0	44,355
ACS Journal Publishing DTD v2.0 20040830	0	0	449,743	0	449,743
Acs INDEX HTML DTD:1.0:02-20-2009	0	0	7	0	7
American Standard Code for Information Interchange:1968	38	0	2,840	0	2,878
Apple StuffIT File Format: UNKNOWN Version	0	0	0	1,137	1,137
Apple-encoded Crystallographic Information File: Unknown Version	0	0	0	3	3
Atypom ACHS NLM Journal Archiving and Interchange DTD:2.2.1:2010-11	0	0	54,760	0	54,760
Atypom ACHS NLM Journal Archiving and Interchange DTD:2.2.2:2014-10	0	0	54,795	0	54,795
Audio Video Interleave:UNKNOWN	0	0	0	5,613	5,613
Bytestream:1.0	0	0	3,086	0	3,086
Cascading Style Sheet: Unknown Level	0	0	0	1	1
ChemDraw Exchange: UNKNOWN	0	0	0	99	99
Chemical Markup Language: UNKNOWN	0	0	0	1	1
Comma Separated Values:1968	0	0	0	18	18
Corel WordPerfect Unknown Version	0	0	0	2	2
Crystallographic Information File: UNKNOWN	0	0	0	30,085	30,085
Encapsulated Postscript:UNKNOWN	0	0	0	2,307	2,307
GNU Zip:none:1993-07	0	0	26	0	26

The possible statuses are:

- **Well Formed and Valid:** the file completely matches its format specification
- **Well Formed and Not Valid:** the file matches its format specification, but has an ill-formed value in the metadata (or, in the case of XML, if the file parses, but does not conform to its DTD or schema)
- **Not Well Formed:** the file does not match its format specification
- **Not Determined:** the file format does not yet have a validation module in JHOVE (as the community develops validation modules for these other formats, Portico will check these preserved files for format validity and cache sufficient technical metadata to administer the archive)

Browsing a Journal

From the journal summaries tab of the publisher page or from the electronic journals page (see the top navigation bar), you can browse to view the volumes and issues preserved for any journal. Below is an example from the American Chemical Society.

The screenshot shows the Portico dashboard for the journal NANO LETTERS. At the top, there is a navigation bar with links for HOME and CONTACT US. Below this, there are tabs for ELECTRONIC JOURNALS, ELECTRONIC BOOKS, PUBLISHERS, REPORTS, and a MORE dropdown menu. The main content area is titled "NANO LETTERS" and includes a "Dashboard" section with a handwritten note "Dashboard" and a legend: a green circle with a checkmark for "Perpetual Access" and a red circle with an X for "Not ingested". There are two green buttons: "DOWNLOAD HOLDINGS" and "COMPARE HOLDINGS". A table of metadata follows, listing Publisher (American Chemical Society), Agreement Name (American Chemical Society Agreement, Version 1.0 (March 1, 2014)), PCA allowed (No), Identifiers (ISSN 15306984, Portico Journal ID ISSN_15306984), and Stable URL (http://audit.portico.org/stable?cs=ISSN_15306984). Below the table, a dropdown menu is expanded to show a list of issues organized by year: 2010s, 2014 (issues v. 14, n. 5 to 12), 2013 (issues v. 13, n. 9 to 14), and 2012 (issues v. 13, n. 6 to 8).

Selecting any of the issues will take you to an issue table of contents. Note that what is presented is an issue table of contents built on the data that Portico has for the publisher. In the majority of cases, this will match what the publisher has published, but it may not always. Please be aware that Portico may have duplicate articles—Portico is implementing several deduplication systems that will eventually merge duplicate articles.

Issue Table of Contents

HOME | CONTACT US | GLOSSARY | WELCOME Portico Librarian | LOGOUT

ELECTRONIC JOURNALS | ELECTRONIC BOOKS | PUBLISHERS | REPORTS | MORE

PORTICO

Dashboard

Perpetual Access
Not ingested

DOWNLOAD HOLDINGS
COMPARE HOLDINGS

NANO LETTERS

Nano Letters v. 14, n. 12

Publisher	American Chemical Society
Agreement Name	American Chemical Society Agreement, Version 1.0 (March 1, 2007)
PCA allowed	No
Identifiers	ISSN 15306984 Portico Journal ID ISSN_15306984

Table of Contents

Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus
Yuanyue Liu, Fangbo Xu, Ziang Zhang, Evgeni S. Penev, Boris I. Yakobson
Nano Letters v. 14, n. 12 (27 August 2014): 6782-6786
DOI: 10.1021/nl5021393
Portico Content Set: ISSN_15306984, (American Chemical Society)
ISSN: 15306984, 15306992
Portico Item ID: ark:/27927/pgh2f9xxv1j
PDF | HTML | Preservation Information | Tree View | PMD | XML

Selective Synthesis of Compound Semiconductor/Oxide Composite Nanowires
Hideaki Hibi, Masahito Yamaguchi, Naoki Yamamoto, Fumitaro Ishikawa
Nano Letters v. 14, n. 12 (29 October 2014): 7024-7030
DOI: 10.1021/nl503385g
Portico Content Set: ISSN_15306984, (American Chemical Society)
ISSN: 15306984, 15306992
Portico Item ID: ark:/27927/pgh2f9xxmz
PDF | HTML | Preservation Information | Tree View | PMD | XML

Nanowires of Methylammonium Lead Iodide (CH₃NH₃PbI₃) Prepared by Low Temperature Solution-Mediated Crystallization
Endre Horváth, Massimo Spina, Zsolt Szekrényes, Katalin Kamarás, Richard Gaal, David Gachet, László Forró
Nano Letters v. 14, n. 12 (05 November 2014): 6761-6766
DOI: 10.1021/nl5020684
Portico Content Set: ISSN_15306984, (American Chemical Society)
ISSN: 15306984, 15306992
Portico Item ID: ark:/27927/pgh2f9xzb
PDF | HTML | Preservation Information | Tree View | PMD | XML

Strongly Coupled Plasmonic Modes on Macroscopic Areas via Template-Assisted Colloidal Self-Assembly
Christoph Hanske, Moritz Tebbe, Christian Kuttner, Vera Bieber, Vladimir V. Tsukruk, Munish Chanana, Tobias A. F. König, Andreas Fery
Nano Letters v. 14, n. 12 (05 November 2014): 6863-6871
DOI: 10.1021/nl502776s
Portico Content Set: ISSN_15306984, (American Chemical Society)
ISSN: 15306984, 15306992
Portico Item ID: ark:/27927/pgh2f9xws6
PDF | HTML | Preservation Information | Tree View | PMD | XML

Osmotically-Driven Transport in Carbon Nanotube Porins
Kyunghoon Kim, Jia Geng, Ramya Tunuguntla, Luis R. Comolli, Costas P. Grigoropoulos, Caroline M. Ajo-Franklin, Aleksandr Noy
Nano Letters v. 14, n. 12 (05 November 2014): 7051-7056

The links under each article citation offer different views of the preserved content. The most likely options for e-journal articles are:

- **PDF:** the article view page will open with the PDF file open in the content frame
- **HTML:** the article view page will open with the full-text HTML of the article open in the content frame
- **Additional Information:** the article view page will open with the header-text HTML (bibliographic metadata only) of the article open in the content frame
- **Preservation Information:** a small slice of preservation metadata for the article will open in the content frame of the article view page
- **Tree View:** the article view page will open with a tree layout of the article and its files as represented within the Portico content model

- **PMD:** the XML of the Portico PMD (preservation metadata) file will open in the article view page
- **XML:** either the Portico XML file will open in the content frame of the article view page or a list of Portico XML files will open (the publisher supplied XML file is preserved, but it is not available for audit by librarians)

In the top right corner of the article view page is a button to show the “compare view” version of the page. This will let you open two different files associated with the article side-by-side.

A few examples of the article view page are below (note how the same links found under the citation on the list page can be found as tabs on the article view page).

PDF

ELECTRONIC JOURNALS
ELECTRONIC BOOKS
PUBLISHERS
REPORTS
MORE ▾

← RETURN
COMPARE VIEW


NANO LETTERS

Nano Letters v. 14, n. 12

Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus
 Yuanyue Liu, Fangbo Xu, Ziang Zhang, Evgeni S. Penev, Boris I. Yakobson
 Nano Letters v. 14, n. 12 (27 August 2014): 6782-6786
 DOI: 10.1021/nl5021393
 Portico Content Set: ISSN_15306984, (American Chemical Society)
 ISSN: 15306984, 15306992
 Portico Item ID: ark:/27927/pgh2zf9xv1j

Agreement Name: American Chemical Society Agreement, Version 1.0 (March 1, 2007)
 PCA allowed: No
 Stable URL: <http://audit.portico.org/stable?au=pgh2zf9xv1j>

PDF
HTML
Preservation Information
Tree View
PMD
XML



Letter
pubs.acs.org/NanoLett

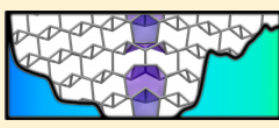
Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus

Yuanyue Liu, Fangbo Xu, Ziang Zhang, Evgeni S. Penev, and Boris I. Yakobson*

Department of Materials Science and NanoEngineering, Department of Chemistry, and the Smalley Institute for Nanoscale Science and Technology, Rice University, Houston, Texas 77005, United States

Supporting Information

ABSTRACT: The deep gap states created by defects in semiconductors typically deteriorate the performance of (opto)electronic devices. This has limited the applications of two-dimensional (2D) metal dichalcogenides (MX₂) and underscored the need for a new 2D semiconductor without defect-induced deep gap states. In this work, we demonstrate that a 2D mono-elemental semiconductor is a promising candidate. This is exemplified by first-principles study of 2D phosphorus (P), a recently fabricated high-mobility semiconductor. Most of the defects, including intrinsic point defects and grain boundaries, are electronically inactive, thanks to the homoelemental bonding, which is not preferred in heteroelemental system such as MX₂. Unlike MX₂, the edges of which create deep gap states and cannot be eliminated by passivation, the edge states of 2D P can be removed from the band gap by hydrogen termination. We further find that both the type and the concentration of charge carriers in 2D P can be tuned by doping with foreign atoms. Our work sheds light on the role of defects in the electronic



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NANO LETTERS

Nano Letters v. 14, n. 12

Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus
Yuanyue Liu, Fangbo Xu, Ziang Zhang, Evgeni S. Penev, Boris I. Yakobson
Nano Letters v. 14, n. 12 (27 August 2014): 6782-6786
DOI: 10.1021/nl5021393
Portico Content Set: ISSN_15306984, (American Chemical Society)
ISSN: 15306984, 15306992
Portico Item ID: ark:/27927/pgh2zf9xv1j

Agreement Name: American Chemical Society Agreement, Version 1.0 (March 1, 2007)
PCA allowed: No
Stable URL: <http://audit.portico.org/stable?au=pgh2zf9xv1j>

PDF | **HTML** | Preservation Information | Tree View | PMD | XML

Nano Letters

Nano Lett.
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Volume: 14, Issue: 12, pages 6782-6786
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Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus

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Correspondence to: ^{*} (email: biy@rice.edu).

Supplementary Material: [application/pdf](#) (size: 3499128 bytes)

nl5021393_si_001.pdf

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▼ AU - ark:/27927/pgh2zf9xv1j

- ▼ CU - 1 - Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus
 - ▼ FU - 1 - Text: Marked Up Full Text
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/nl5021393.xml (status=Inactive) (origin=Provider,Supplied Content)
 - SU - /ingest/workarea/0b0086f1ccf0ff0e/output/acs-current/pgh2zf9fxp9/pgh2zf9fxp9.xml (status=Active) (origin=Archive,Migration)
 - ▼ FU - 2 - Rendition: Page Images
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/nl5021393.pdf (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 3 - Component: Other
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/suppl/nl5021393_si_001.pdf (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 4 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0007.tif (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 5 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0006.tif (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 6 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0005.tif (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 7 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0004.tif (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 8 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0003.tif (status=Active) (origin=Provider,Supplied Content)
 - ▼ FU - 9 - Component: Figure Graphic
 - SU - achs_nalefd_10.1021%2fnalefd.2014.14.issue-12_20141210002604.zip/nl5021393/images/nl-2014-021393_0002.tif (status=Active) (origin=Provider,Supplied Content)

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NANO LETTERS

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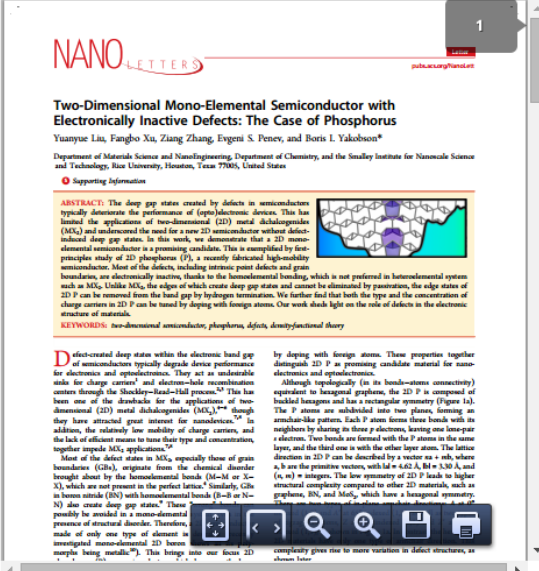
Two-Dimensional Mono-Elemental Semiconductor with Electronically Inactive Defects: The Case of Phosphorus

Yuan Yue Liu, Fangbo Xu, Ziang Zhang, Evgeni S. Penev, and Boris I. Yakobson[†]

Department of Materials Science and NanoEngineering, Department of Chemistry, and the Smalley Institute for Nanoscale Science and Technology, Rice University, Houston, Texas 77005, United States

Correspondence to: [†](email: biy@rice.edu).

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ABSTRACT: The deep gap states created by defects in semiconductors typically deteriorate the performance of optoelectronic devices. This has limited the applications of two-dimensional (2D) metal dichalcogenides (M₂C) and underscored the need for a new 2D semiconductor without defect-induced deep gap states. In this work, we demonstrate that a 2D mono-elemental semiconductor is a promising candidate. This is exemplified by first-principles study of 2D phosphorus (P), a recently fabricated high-mobility semiconductor. Most of the defects, including intrinsic point defects and grain boundaries, are electronically inactive, thanks to the homoelemental bonding, which is not preferred in heteroelemental systems such as M₂C. Unlike M₂C, the edges of which create deep gap states and cannot be eliminated by passivation, the edge states of 2D P can be removed from the band gap by hydrogen termination. We further find that both the type and the concentration of charge centers in 2D P can be tuned by doping with foreign atoms. Our work sheds light on the role of defects in the electronic structure of materials.

KEYWORDS: two-dimensional semiconductor, phosphorus, defects, density-functional theory

Defect-created deep states within the electronic band gap of semiconductors typically degrade device performance for electronics and optoelectronics. They act as undesirable sinks for charge carriers¹ and electron-hole recombination centers through the Shockley-Read-Hall process.^{2,3} This has been one of the drawbacks for the applications of two-dimensional (2D) metal dichalcogenides (M₂C),⁴⁻⁷ though they have attracted great interest for nanoelectronics.^{8,9} In addition, the relatively low mobility of charge carriers, and the lack of efficient means to tune their type and concentration, together impede M₂C applications.¹⁰

Most of the defect states in M₂C, especially those of grain boundaries (GBs), originate from the chemical disorder brought about by the heteroelemental bonds (M-M or X-X), which are not present in the perfect lattice.¹¹ Similarly, GBs in boron nitride (BN) with homoelemental bonds (B-B or N-N) also create deep gap states.¹² These homoelemental bonds possibly be avoided in a mono-elemental presence of structural disorder. Therefore, made of only one type of element as investigated mono-elemental 2D boron sample being metallic.¹³ This brings one one from 2D

by doping with foreign atoms. These properties together distinguish 2D P as promising candidate material for nano-electronics and optoelectronics.

Although topologically (in its band-structure connectivity) equivalent to hexagonal graphene, the 2D P is composed of buckled hexagons and has a rectangular symmetry (Figure 1a). The P atoms are subdivided into two planes, forming an armchair-like pattern. Each P atom forms three bonds with its neighbors by sharing its three p electrons, leaving one lone-pair electron. Two bonds are formed with the P atoms in the same layer, and the third one is with the other layer atom. The lattice structure in 2D P can be described by a vector \mathbf{a} in x-y plane, where \mathbf{a}_1 and \mathbf{a}_2 are the primitive vectors, with $|\mathbf{a}_1| = 4.62 \text{ \AA}$, $|\mathbf{a}_2| = 3.30 \text{ \AA}$, and $(\mathbf{a}_1, \mathbf{a}_2) = 90^\circ$. The low symmetry of 2D P leads to higher structural complexity compared to other 2D materials, such as graphene, BN, and MoS₂, which have a hexagonal symmetry.

complexity gives rise to more varieties in defect structures, as shown later.

E-Journal Completeness Report


In order to address content that has never been delivered to Portico, it is necessary for Portico to understand what content it should have received—in essence, necessary for Portico to know the publication pattern of the journal. Unfortunately, there is no master list of issues published. Thus, over the past several years, Portico has developed a missing issue completeness tool to 1) analyze the Portico preserved content and predict the publication pattern of each journal (the number of issues per volume), 2) to take that information and identify issues that are possibly missing or incomplete, and 3) to take the information of content that is missing and identify whether the content is on hand but with content issues to be resolved or has never been sent to Portico.

The analysis is a three pass process. The software walks through the preserved content for every journal and analyzes the publication patterns. It uses the information it has found to theorize the number of issues published in each year by the journal. For example, the Portico tools have guessed that the publication pattern for *Dutch Crossing*, a Maney Publishing title, is as follows:

- 2009: 2 issues
- 2010: 3 issues
- 2011: 3 issues
- 2012: 3 issues
- 2013: 3 issues
- 2014: 3 issues

The second pass of the analysis is to identify what issues might be missing from the Portico archive, given the issues we have on hand and the issues we have predicted should exist. This second pass also considers which issues might be incomplete, a determination made by considering the average number of articles published in the issues of this particular journal and the page numbering of articles within the issue. Issues will be identified as either missing, incomplete, or unknown (which means we have content for the issue, but are not confident the issue is complete—this will often occur when the page numbers of a volume run sequentially through all the issues and Portico has not yet preserved all of the issues for the volume).

The completeness analysis described above is used by Portico to request missing issues from the publishers. It is also used internally for reporting purposes and a flavor of it is made available in the Dashboard in the form of a matrix called the Completeness Page. These completeness pages are available from both the journal browse page:



The screenshot shows the Portico Dashboard for the journal ALEXANDRIA. The dashboard includes a navigation menu with options like ELECTRONIC JOURNALS, ELECTRONIC BOOKS, PUBLISHERS, and REPORTS. A yellow arrow points to a green button labeled 'VIEW COMPLETENESS' in the top right corner. The main content area displays the journal's publisher (Manchester University Press), agreement name, ISSN (09557490), and Portico Journal ID (ISSN_09557490). Below this, there is a section for the year 2014, showing volume 25, issues 1-2.

And the journal summaries tab on the publisher page:

MANCHESTER UNIVERSITY PRESS AS OF 24-JAN-2015

Dashboard | OVERVIEW | **JOURNAL SUMMARIES** | FILE STATUS REPORT

Title	ISSN	Start Year	Start Volume	Start Issue	End Year	End Volume	End Issue	Completeness Report
Alexandria	09557490, 20504551	2009	21	1	2015	25	2	VIEW
Bulletin of the John Rylands Library	20528051, 0301102X	1999	81	1	2013	89	2	VIEW
Bulletin of the John Rylands University Library of Manchester	20549326, 20549318	2014	90	1	2014	90	2	VIEW
Cahiers Élisabéthains: A Biannual Journal of English Renaissance Studies	20544715, 01847678	1999	40th Anniversary Special Issue		2014	Special Issue 2007		VIEW
Critical Studies in Television	17496039, 17496020	2006	1	1	2014	9	3	VIEW
Ethnicity and Race in a Changing World	17588685	2009	1	1	2014	5	1	VIEW
Film Studies	14690314	0	0					VIEW
Gothic Studies	2050456X, 13627937	1999	1	1	2014	16	1	VIEW
International Journal of Electrical Engineering Education	00207209, 20504578	1999	36	1	2014	51	3	VIEW

Selecting any of these links will open a new web browser tab with a matrix where the volumes are listed along the y-axis and the issues along the x-axis. Each issue has a cell and its status, publication date, and number of articles preserved can be found in each cell.

ALEXANDRIA

Publisher: Manchester University Press

Identifier: Content Set ID: ISSN_09557490

Completeness: as of Nov 21, 2014

Years Preserved: 2009, 2011-2013 (v.21-24)

Portico Holdings: 2009 - v. 21 (1-3), 2011 - v. 22 (1-3), 2012 - v. 23 (1-3), 2013 - v. 24 (1-3)

Publication Pattern: 3,3,3,3

Status: Journal complete

	1	2	3
v.21 (2009)	n.1: Complete Pub Date: 2009-04-01 Articles: 7	n.2: Complete Pub Date: 2009-08-01 Articles: 7	n.3: Complete Pub Date: 2009-12-01 Articles: 8
v.22 (2011)	n.1: Complete Pub Date: 2011-04-01 Articles: 7	n.2-3: Complete Pub Date: 2011-12-01 Articles: 10	
v.23 (2012)	n.1: Complete Pub Date: 2012-04-01 Articles: 9	n.2: Complete Pub Date: 2012-08-01 Articles: 8	n.3: Complete Pub Date: 2012-12-01 Articles: 20
v.24 (2013)	n.1: Complete Pub Date: 2013-04-01 Articles: 7	n.2: Complete Pub Date: 2013-08-01 Articles: 9	n.3: Complete Pub Date: 2013-12-01 Articles: 6

By Portico's assessment, the journal *Alexandria* is complete and is not missing any content.

Below is the completeness page for *Accounting, Auditing & Accountability Journal*, which has some statuses besides "Complete" on the issues:

ACCOUNTING, AUDITING & ACCOUNTABILITY JOURNAL

Publisher Emerald Group Publishing

Identifier Content Set ID ISSN_09513574

Completeness Years Preserved: 1988-2014 (v.1-27)

as of Nov 21, 2014

Portico Holdings: 1988 - v. 1 (1-2), 1989 - v. 2 (1-3), 1990 - v. 3 (1-3), 1991 - v. 4 (1-4), 1992 - v. 5 (1-4), 1993 - v. 6 (1-4), 1994 - v. 7 (1-4), 1995 - v. 8 (1-5), 1996 - v. 9 (1-5), 1997 - v. 10 (1-5), 1998 - v. 11 (1-5), 1999 - v. 12 (1-5), 2000 - v. 13 (1-5), 2001 - v. 14 (1-5), 2002 - v. 15 (1-5), 2003 - v. 16 (1-5), 2004 - v. 17 (1-5), 2005 - v. 18 (1-6), 2006 - v. 19 (1-6), 2007 - v. 20 (1-6), 2008 - v. 21 (1-8), 2009 - v. 22 (1-8), 2010 - v. 23 (1-8), 2011 - v. 24 (1-8), 2012 - v. 25 (1-8), 2013 - v. 26 (1-8), 2014 - v. 27 (1-4)

Status Journal Incomplete

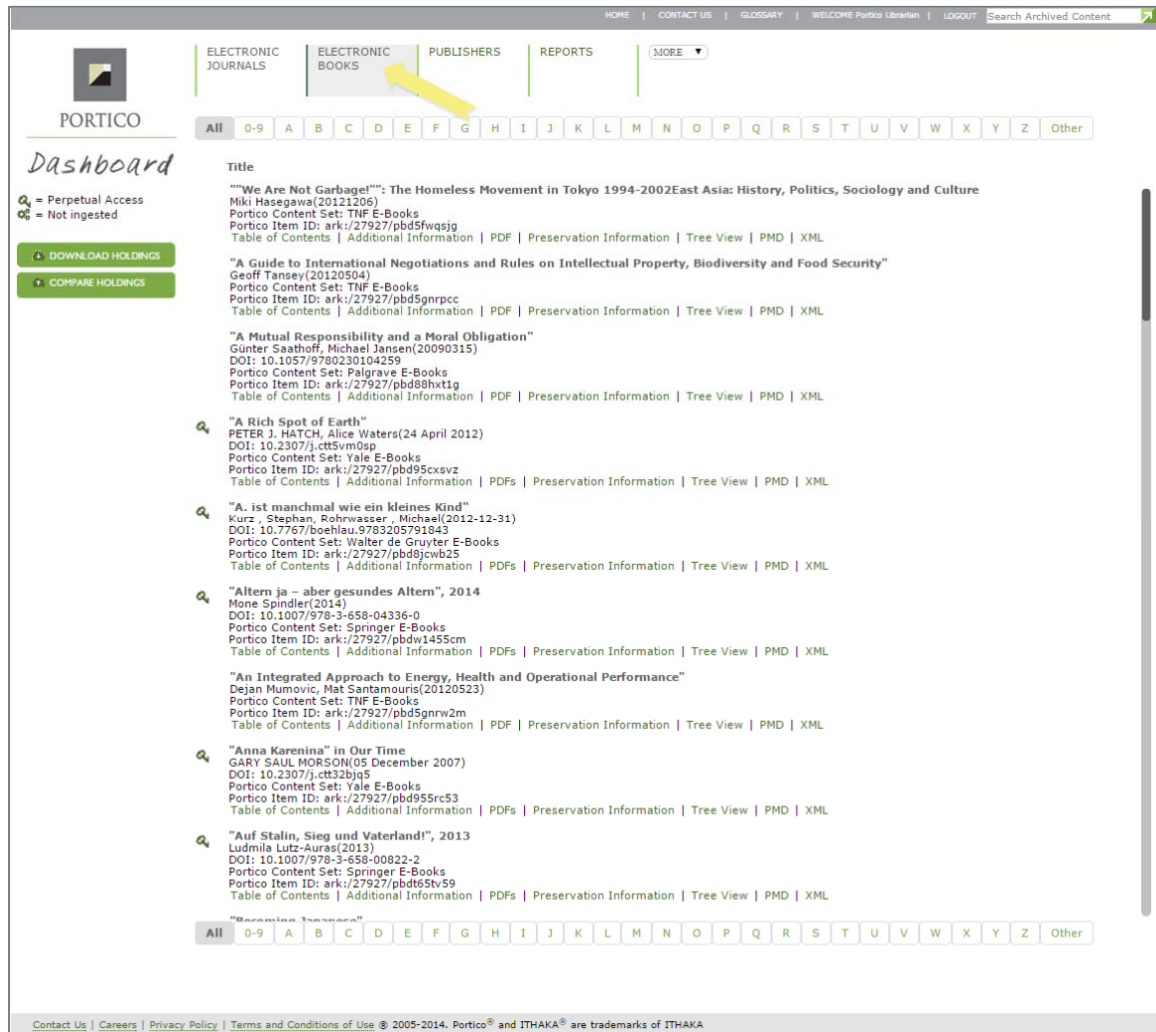
	1	2	3	4	5	6	7	8
v.1 (1988)	n.1: Complete Pub Date: 1988-01-01 Articles: 4	n.2: Complete Pub Date: 1988-01-01 Articles: 4	n.3: Missing Pub Date: 1988-12-30	No more issues				
v.2 (1989)	n.1: Unknown Pub Date: 1989-01-01 Articles: 4	n.2: Unknown Pub Date: 1989-01-01 Articles: 4	n.3: Unknown Pub Date: 1989-01-01 Articles: 3	No more issues				
...								
v.26 (2013)	n.1: Complete Pub Date: 2013-01-01 Articles: 8	n.2: Complete Pub Date: 2013-01-01 Articles: 6	n.3: Complete Pub Date: 2013-01-01 Articles: 7	n.4: Complete Pub Date: 2013-01-01 Articles: 5	n.5: Unknown Pub Date: 2013-01-01 Articles: 7	n.6: Complete Pub Date: 2013-01-01 Articles: 5	n.7: Complete Pub Date: 2013-01-01 Articles: 5	n.8: Complete Pub Date: 2013-01-01 Articles: 5
v.27 (2014)	n.1: Complete Pub Date: 2014-01-01 Articles: 7	n.2: Complete Pub Date: 2014-01-01 Articles: 6	n.3: Complete Pub Date: 2014-01-01 Articles: 6	n.4: Complete Pub Date: 2014-01-01 Articles: 5	n.5: Missing Pub Date: 2014-08-16	n.6: Not yet published Pub Date: 2015-05-16	n.7: Not yet published Pub Date: 2016-03-30	n.8: Not yet published Pub Date: 2017-03-30

Above we can see that while Portico has content from v. 2 (1), v. 2 (2), v. 2 (3), and v. 26 (5) the analysis code was not willing to unequivocally state that these three issues were complete, and thus they have been given a status of "Unknown". In addition, because v. 27 (5) should have been published several months ago, it has been identified as "Missing", as opposed to v. 27 (6), v. 27 (7), and v. 27 (8) which have a status of "Not yet published".

The status of "Incomplete" is not represented in the examples above, but it will be highlighted by a bar of yellow when it occurs.

Books

A listing of all the books currently preserved in the Portico Archive is available by selecting the “Electronic Books” tab at the very top of the page.



The screenshot shows the Portico Dashboard interface. At the top, there are navigation links: HOME, CONTACT US, GLOSSARY, WELCOME Portico Librarian, and LOGOUT. A search bar for 'Search Archived Content' is on the right. Below the navigation, there are tabs for 'ELECTRONIC JOURNALS', 'ELECTRONIC BOOKS' (highlighted with a yellow arrow), 'PUBLISHERS', 'REPORTS', and 'MORE'. A secondary navigation bar contains letters A through Z and 'Other'. The main content area is titled 'Dashboard' and includes a search icon, 'Perpetual Access', and 'Not ingested' status. Below this are buttons for 'DOWNLOAD HOLDINGS' and 'COMPARE HOLDINGS'. The book list includes titles such as '“We Are Not Garbage!”: The Homeless Movement in Tokyo 1994-2002', 'A Guide to International Negotiations and Rules on Intellectual Property, Biodiversity and Food Security', 'A Mutual Responsibility and a Moral Obligation', 'A Rich Spot of Earth', 'A. ist manchmal wie ein kleines Kind', 'Altern ja – aber gesundes Altern', 'An Integrated Approach to Energy, Health and Operational Performance', 'Anna Karenina in Our Time', and 'Auf Stalin, Sieg und Vaterland!'. Each entry provides the author, DOI, Portico Content Set, Portico Item ID, and links for 'Table of Contents', 'Additional Information', 'PDF', 'Preservation Information', 'Tree View', 'PMD', and 'XML'. A secondary navigation bar with letters A through Z and 'Other' is at the bottom of the list. The footer contains 'Contact Us | Careers | Privacy Policy | Terms and Conditions of Use © 2005-2014. Portico® and ITHAKA® are trademarks of ITHAKA'.

Each book listed has been preserved in the Portico Archive. As with journals, there are a number of links underneath each book, each opening up a different file or list of files associated with the book in the book view page. The most likely options for e-books are:

- **Table of Contents:** a pretty, abbreviated HTML version of the book with links to the chapter PDFs will open in the content frame
- **Additional Information:** a full rendition of the HTML version of the book will open in the content frame

- **PDF:** the book view page will open with the PDF file open in the content frame
- **PDFs:** the book view page will open with a list of the PDF files for this book open in the content frame
- **Preservation Information:** a small slice of preservation metadata for the book will open in the content frame of the book view page
- **Tree View:** the book view page will open with a tree layout of the book and its files as represented within the Portico content model
- **PMD:** the XML of the Portico PMD (preservation metadata) file will open in the article view page
- **XML:** either the Portico XML file will open in the content frame of the article view page or a list of several Portico XML files will open (the publisher supplied XML is preserved, but it is not available for audit by librarians)

The book view pages look just like the e-journal article view pages.

Reports

There are a number of reports available on the Reports page, including facts and figures, archive growth, XLSX files listing preserved books, journals and digitize collections.

Search

There is a search box on the top right of every page of the Dashboard—this tool searches the descriptive metadata of the articles, it does not search the full-text of the articles at this time. It is very useful when you would like to find an article for which you have a DOI.



The search results will be a list of citations that will look quite similar in display to the manner in which a journal issue table of contents is displayed:



Any Questions?

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