

Publishing ECS Content

by Mary E. Yess

In this issue of *Interface*, Guest Editor Richard McCreery notes that if “one takes an optimistic view of molecular electronics, there is support for the idea of a paradigm shift of a scale as large as that from vacuum tubes to transistors that occurred in the 1950s and 1960s.” It is appropriate then, in this same issue, to report on a similar shift that is occurring in the field of scholarly publishing and on the challenges ECS faces in publishing its content. The publication paradigm, for professional societies as well as commercial publishers, has changed largely because of the growth of the Internet and allied electronic technologies. The challenge is to find the right sources of information, to distinguish between good information and bad information, and to be able to benefit from the good information once it is found. That is where the scholarly society comes into play.

Information ≠ Knowledge: The Role of Scholarly Societies

Not-for-profit publishers represent a large part of the technical publishing community—they own and publish at least half of all peer-reviewed journals¹—but scholarly society publishers are different from commercial publishers in a very important way. A scholarly society does not have to return dividends to its stockholders. A scholarly society is only answerable to the most important people in the process: members, authors, and readers. Authors want to publish in the highest quality venue; they want to communicate their findings to the widest possible audience as quickly as possible; and they want to have access to that same body of material. They want the presentation of information to adhere to standards: editorial quality and fair dealing; a comprehensive content archive; and the ability to consistently view text, graphics, video, as well as mathematical and scientific notation.

The chief job of societies as publishers is to enable their members and authors to turn information into knowledge. Because a scholarly society is a sounding board for authors and a base of contact with a community of peers, it is the obligation of its members, authors, and readers to support society initiatives. Key to enabling this exchange are a society's meetings and publications, especially its technical journals, where the primary technical record is established. ECS is the focal point for the broad scientific and technical community that encompasses electrochemistry and solid-state science and technology, largely

because of its journals. From 1998 to 2003, ECS has fully transformed its peer-reviewed content—from one traditional, paper-only product to two completely Web-based rapid-publication leaders²—a major accomplishment in just five years.

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In addition to keeping up with all the technology changes, another challenge facing society publishers is that they are being lumped together with commercial publishers and their high-priced serials, and thus come under attack for contributing to the malfunction of library budgets. Eliminating the cost of one or more “middlemen”—e.g., the publisher—and getting the content directly from the authors is often proposed as a solution, and there is

a great deal of momentum behind this “Open Access” (OA)³ movement. But the publisher is much more than a middleman, and much could be lost by eliminating that role. Publishers add value to content: selection; review and evaluation; filtering good from bad; maintaining standards through editing and formatting; brokering partnerships, setting up and managing teams, supervising a fragmented development process, underwriting the financial risk, handling back-office procedures, marketing and distribution, and archiving.⁴ Society publishers perform what is possibly the most important part of the process—peer review—in a tried-and-true way; and have been doing so since the first scholarly journals were published.⁵ Scholarly societies have often been the leaders in online publication—ECS was one of the very first in the field to offer article-at-a-time publishing when it launched *Electrochemical and Solid-State Letters* back in 1998.

The production process is no longer simply a matter of aesthetics and something easily eliminated. To make sure the article is published as quickly and accurately as possible, and function well on the Web, manuscripts must pass through many more sophisticated stages. At ECS, manuscripts are submitted through a Web-based piece of software and pass through the multi-step process of peer review; if accepted, they are copy edited and move on to production. Once there, another set of complex steps are taken: the article is encoded and hosted in such a way as to ensure its persistent interoperability on the Web. The article is sent to various abstracting and indexing services and databases to ensure maximum visibility for the authors.⁶ Societies such as ECS guarantee that they will maintain a permanent, usable archive, or in the advent of dissolution, will bequeath the archive to other permanent

(continued on page 16)

sources (such as JSTOR⁷). All of the systems that make all of this possible must be constantly maintained and upgraded and the Society must periodically invest in new technologies.

Information ≠ Free: Who's Going to Pay for the "Free" Lunch?

The dynamic aspects of the Internet have become a driving force in the movement for content to be free of all barriers (fees and copyright). Although the tasks to produce a published journal have changed, the magnitude of the costs remain nearly constant—efficiencies in one area being replaced by costs in new areas. In the scholarly publishing and library communities, the serials crisis⁸ has lost primacy as an issue and "open access" is the byword. Open Access comes in several flavors, two of the main ones being self-archiving and open access journals. Self-archiving is what it says it is: the author posts her paper to her own website or to her institution's archive.⁹ Articles submitted to OA journals follow the same peer-review path as other scholarly journals, but they are free to any reader. The costs, however, are borne by the authors.

As noted above, the costs to prepare, host, and maintain high-quality, peer-reviewed, scientific content are many and not trivial. Plain text articles might be simple to convert to Web-ready form, but the numerous equations, tables, and other figures used by scientists in our field, if not properly coded, would be garbled bits and bytes. Articles must be available in several formats to be readable by most browsers and accessible over variable bandwidths. There is the cost of coding to enable the content to be found by the standard scientific databases, indices, and web crawlers. There is the cost to upgrade formats and coding as browser and other Internet standards and requirements change (e.g., the move from SGML to XML). There is the cost for long-term, secure, stable storage; ECS has an obligation to provide a secure archive for the foreseeable future, especially as the role of libraries transforms. Online peer review systems are substantial investments and need to be upgraded and maintained. The same applies to website hosting, database maintenance, and disaster recovery. None of this hardware and software is sui generis—there is still heavy people-power required, which comes with its own costs.

Individual self-archiving costs are next to nothing, but institutional archives cost money, and open access journals cost even more. Open access journals have all the costs of other journals but use a different cost-recovery model—in open access journals, the cost is borne by the author. Figures of as high as \$3,750 per published paper have been given, but other studies give between \$800 (excluding overhead) and \$1,545 (including overhead) per published paper.¹⁰

The "author pays" model has many problems. The paper writing, submission, acceptance, etc., occurs primarily after the research is done and the money is spent. With low page charge

fees, an author could possibly afford to pay, but if the article fees go up to > \$1,500 per article, the author is unlikely to do so and can't go back to one or multiple funding sources to ask for more money. Authors can be part of large research projects composed of multinational teams, further complicating the funding sources. Authors have a difficult enough time finding funding to cover the research, let alone trying to find additional funding for high publication fees.

Currently, the most well-known open access journal is the Public Library of Science¹¹ and it charges its authors \$1,500 per paper; however, PLOS also is able to function because of a \$9 million dollar grant.

Authors should not have to bear the costs alone, and not all societies will be fortunate enough to win multi-million dollar grants. At ECS, we spread the burden of the cost of publishing across as many segments as possible: corporations and universities buy low-cost subscriptions; authors pay nominal page charges; ECS members pay modest annual dues; and the Society itself

invests thousands of dollars every year in building and upgrading the infrastructure required for making the journals as accessible as possible. ECS's commitment extends past maintaining the status quo and is preparing now to undertake the next stage in content development: the ECS Digital Library.

The ECS Digital Library

The ECS online content is growing in quantity and richness. The richness comes from the very nature of what the Society does, and from being interoperable, i.e., opening up a two-way street with the broader, far-reaching sources of the science community in general.

What remains to be done is to put all ECS content into one place, and make it easy to use. This involves re-thinking content delivery and creating resources for researchers to help cut through the information overload; and it involves some new editorial functions to help develop multi-purposed content (e.g. "themed" collections of journal and PV papers).

Approximately 4,000 abstracts are received each year for ECS meetings. Over 1,600 manuscripts are submitted to the ECS journals, some of it originating from presentations at ECS meetings. ECS publishes approximately 1,000 papers in 20-30 proceedings volumes each year, and *Interface* publishes important technical content as well. The ECS website serves as an entry to all this content and is in itself a source of rich material and out-bound linking. Each publication has a different content submission and hosting system; and although articles in one ECS publication often reference material from another, only the two technical journals are linked. To provide the connectivity so essential in the current scientific community, plans are underway to build a digital library.

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The ECS Digital Library—
All ECS content
in one seamless resource,
available all the time.

(continued on page 52)

PUBLISHING ECS CONTENT...

(continued from page 16)

The ECS Digital Library plan includes the following components

- Robust interoperable infrastructure
- Complete meeting abstracts system
- New publication venue for meeting papers
- Rich and deep content archives
- ECS Learning Center
- ECS History Room
- Easy, integrated content delivery

Robust interoperable infrastructure—ECS has completed a very successful two-year project to implement an online manuscript submission and peer review system for its technical journals, using Peer X-Press (PXP) from the American Institute of Physics.¹² PXP has enabled the rapid, and easy, submission of manuscripts, and allowed for faster peer review, faster decisions on manuscripts, and faster production turn-around times. The Society is reviewing PXP and other systems for the submission of meeting abstracts, full meeting papers, and proceedings volume papers. After submission, these pieces of

ECS has been working on
ECS Transactions, an online
database to include papers from
proceedings volumes as well as
other full meeting papers not
included in a PV, enabling wider
dissemination of the content
at low cost.

content would be published in *ECS Transactions*, in meeting abstracts volumes, and in proceedings volumes.

Complete meeting abstracts system—ECS is reviewing new software to replace the current system, which was written for ECS nearly ten years ago. New systems will be looked at with a view to acquiring one that is integrated with the manuscript submission software used by the Society's other publications.

With a new submission system, meeting abstracts would be available all the time. They could contain "forward links" so that if an abstract goes on to become a full paper, the abstract would be linked to that full paper through our CrossRef linking arrangements.

New publication venue for meeting papers—ECS has been working on *ECS Transactions*, an online database that will include papers from proceedings volumes (PVs) and enable inclusion of other full meeting papers not included in a PV. This new approach

will allow for much wider dissemination of the content at a much lower cost than the case-bound books alone. Outbound reference linking from *ECS Transactions* papers to other sources would be a key feature of this publication, giving articles the exposure level of the ECS technical journals, and thus

An Overview of ECS Content

Technical Journals—ECS has two peer-reviewed technical journals—the *Journal of The Electrochemical Society* and *Electrochemical and Solid-State Letters*. Both are electronic first journals, followed by monthly paper editions and an annual CD-ROM edition. The journals are produced and hosted for the Society by the American Institute of Physics (AIP). They are hosted in a state-of-the-art data center and carefully monitored to ensure uninterrupted service.

Individual articles are posted to the online site as soon as they're ready for posting. E-first articles are fully citable from the time they're published electronically, often weeks before they appear in print. The online user interface is richly featured, providing users with many powerful electronic capabilities for accessing, acquiring, and using scholarly publications. ECS is a member of the CrossRef reference linking service, which offers links to more than 3 million articles in thousands of scientific journals, with more than half a million new articles to be linked each year.

Meeting Abstracts—Currently, Meeting Abstracts are published on the Web for a limited period of time, followed by a CD-ROM edition. The Society was one of the first to provide for electronic abstract submission and had a program custom written to accomplish this as well as the meeting programming functions.

Proceedings Volumes—The Society publishes 20-40 proceedings volumes (PVs) each year, from content presented at ECS's meetings. The volumes are currently available in case-bound, limited-run editions. The volumes are indexed with the major services, such as Chemical Abstracts, Institute for Scientific Information, and InterDok. ECS is in the planning stages of an online database of PV and meeting papers, with the working title of ECS Transactions.

Monographs—The Society has several long-standing monograph series, dating back to its first, *Modern Electroplating*, in 1942. Since then, the Society has sponsored the publication of volumes with several leading publishers such as John A. Wiley & Sons and Marcel Dekker.

ECS Website—www.electrochem.org—Visitors can order books and articles and register for meetings; and members also can access the ECS online content, renew membership dues, use the career services features, and enter a discussion forum.

Interface—ECS's quarterly news magazine provides a forum for the lively exchange of ideas and news among members of ECS and the international scientific community at large. Published online (with free access to all) and in paper, issues highlight special features on the state of electrochemical and solid-state science and technology.

a quantum improvement for the proceedings series. Papers that are not included in a PV and are not submitted to the ECS journals currently have nowhere else to be published at ECS and are often sent to other publications, resulting in lost content and a break in the cohesiveness of the content presented at the symposium. *ECS Transactions* will provide another quality publication venue for authors and another resource for researchers.

Rich & deep content archives—ECS is in the process of capturing the legacy content of its flagship, *Journal of The Electrochemical Society*, going back to the first volume from 1902. Once *ECS Transactions* has been established, the Society will also embark on a digitization program for past proceedings volumes, going back to the first volume in 1956. The ECS meeting abstracts will undergo a similar process.

ECS Learning Center—It is important that the current generation of children be introduced to electrochemistry and solid-state science as an important and fascinating component of what makes our world go round. ECS publishes the best content in the field and there is an opportunity and a need to “translate” it for a K-12 audience. ECS also provides many career services features, such as a job board and discussion forum. The Society has begun working with other partners to deliver interactive web-based short courses and other learning tools. These would be integrated with all ECS publications.

History Room—As a result of our work on our centennial celebration (2002), we have been organizing and posting much of our Society’s historical material (photographs, memoirs, etc.). In cooperation with ECS, the Chemical Heritage Foundation has prepared five oral histories on leaders in the field, and an educational exhibit on “Chemistry Is Electric.” On our website, we plan to set up “rooms” for each of our notable founders and leaders, and in them include photographs, published work, and other historical material.

Easy, integrated content delivery—The ECS website would be redesigned as the library’s easy to use “front door” for all published content and the interactive material in the Learning Center. The e-commerce aspects of the Digital Library can also provide a source of revenue to help fund the maintenance of the ECS Digital Library, as well as its future development.

Quality and Continuity

What organizations such as ECS do is to bring reliable filters to bear on the enormous quantity of information now available. A well-respected, 100+ year-old society can help the novice researcher and the veteran find their way through the thicket of information and trust in the selections put before them. Because ECS is a member-driven, not-for-profit society, there is always a careful management of the Society’s resources, but the organization is not motivated by the bottom line. What “profits” are made are reinvested into the development and dissemination of the technical content.

ECS will continue to seek ways to make its technical content as freely available as possible and make it even more

valuable to the electrochemical and solid-state community through projects such as the ECS Digital Library. We will watch the Open Access movement carefully and adjust our strategies to take advantage of the best practices as they emerge. We will continue to move forward in a way that has proven to be the best for the entire community that benefits from the content: to support the continuation of the content through a fair distribution of the costs of publishing high-quality content. This is an ongoing dialogue in the scholarly community and we ask our members, authors, and readers to not only look carefully at where they publish and where they get their content, but to look carefully at the stewardship of the publisher behind that content, and to support those organizations that have their best interests at heart. ■

References and Notes

1. Association of Learned and Professional Society Publishers Response to Science and Technology Committee Inquiry into Scientific Publications, <http://www.alpsp.org/default.htm>, 2004.
2. The ECS journals are ranked #1 and #2 in the field, according to the most recent (2002) ISI *Science Citation Index*, the “gold standard” in the science citation industry.
3. For more about the Open Access movement, see: http://www.alpsp.org/http_openacc.htm, especially Volume 16 of *Learned Publishing*; and the American Scientist Open Access Forum, <http://amsci-forum.amsci.org/archives/American-Scientist-Open-Access-Forum.html>.
4. R. Balkwill, “Supporting Creativity in the Supply Chain: The Role of Creative Teams in the Authoring Process,” *Publishing Research Quarterly*, Vol. 15, No. 3 (1999).
5. *Philosophical Transactions of the Royal Society* is often credited with being the first learned journal; it began publishing in 1665.
6. ECS participates in a number of such arrangements: AIP’s Scitation and SPIN Web, ISI’s Web of Science, The British Library, ChemPort, Chemical Abstracts, Infotrieve, ProQuest, Dialog, EBSCO, and Swets Blackwell.
7. <http://www.jstor.org/>
8. The “serials crisis” acquired its name well over ten years ago in a report commissioned by the Mellon Foundation and published by the Association of Research Libraries. The contributing factors were identified as a spiral of “publish or perish” demands in academia, more serial publications being produced, static or decreasing library budgets resulting in serial acquisition cuts, and reactionary price increases. Although the “crisis” is not over yet, the focus has shifted to the feasibility of “open access.”
9. A good example of an institutional archive is the famous physics preprint server, ArXiv (<http://arxiv.org/>) first begun at Los Alamos and now hosted at Cornell University.
10. “Towards Electronic Journals,” C. Tenopir and D. King, Special Libraries Association, 2000; “The Costs of Learned Journal and Book Publishing,” A. Dryburgh, ALPSP, 2002.
11. Public Library of Science (PLOS) <http://www.plos.org/>
12. The American Institute of Physics (AIP) is a not-for-profit membership organization founded in 1931 that has become a leader in scholarly publishing (<http://www.aip.org/>).

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