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# Open Access

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# Open Access

The adoption of the open access concept was influenced by two major trends of scientific publication in the twenty-first century. The first is a growing recognition of the right of all humanity to directly access reported progress in science and original scientific data in a timely and unfiltered manner, a claim sometimes attributed to Article 27 of the United Nations Universal Declaration of Human Rights.[1] The second is the shift in scientific publication from print to digital form. Coupled with the Internet, digital publication provides a practical and cost-effective platform for uninhibited access to scientific advancement to essentially anyone in the world. The bold vision of open access was promoted by the 2001 Conference on Free Online Scholarship[2] hosted by the Open Society Institute in Budapest, Hungary, that is said to be the genesis of the open access movement. The Budapest open access initiative called for "free availability on the public internet" of all research articles with the "only constraint to give authors control over the integrity of their work and the right to be properly acknowledged and cited." Subscription fees underlying the traditional model for scientific publication are viewed as an impediment to this arguably idealistic vision, and this conference called for fundamental changes to remove that impediment.

The inherent challenge of turning the concept of open access into practice, of course, concerns the cost of publication along with deeply rooted business models. While costs of journal publication vary, a recent study[3] indicates an average publication cost per research article in the range of $3500–4000, particularly for journals with printed issues. Even a not-for-profit publisher like SPIE with substantially lower cost per research article needs to cover this cost in order to provide a sustainable model. Therefore, a full open access journal, providing freely accessible articles from the point of origin, needs to shift this cost from subscribers, including libraries across the world that have been critical to sustaining the traditional journal business model, to authors. This pay-to-publish approach merely seems to transfer the publication impediment from prospective readers, subscribers, and their organizations to prospective authors, introducing new obstacles to the free flow of scientific knowledge in place of those dismantled. Nevertheless, a number of full open access journals have arisen, either as new journals or transformations of traditional journals, and the concept has gained in popularity. Many publishers provide waivers for low-income authors to alleviate the potential bias against them.

A recent evidence-based review examines the academic, economic, and societal impacts of open access.[3] One aspect of this study of particular interest to authors is the impact of open access on citations. The data on this academic impact exhibit significant variability. Of the 70 studies examined, 46 found a statistically significant increase in citations comparing open access to traditional articles. The average increase appears to be on the order of 100%, but with considerable, unexplained variance across journals and research areas. The field of optics appears to be near or below the average, but this is difficult to pinpoint from the data provided.

As traditional journals wrestled with how to respond to the open access movement, being responsive to the emerging trends without alienating their stakeholders, many adopted a hybrid model. The foundation of this model is to give authors the choice to decide whether their articles are open access, for which they pay a fee to cover publication costs, or available only for subscribers, for which there is no compulsory fee. *Optical Engineering* currently operates under this model, with a detailed policy that can be found on our website.[4]

When some journals initially adopted the hybrid open access model, it was considered an experiment that ultimately would lead to full open access if it proved successful. There have been several assessments on the level of success that has been achieved. In his 2012 article,[5] Bo-Christopher Björk, a leading proponent of open access, provides a fairly dismal account of hybrid open access, indicating high article processing charges, on the order of $3000 per article, and a low percentage of open access publications in hybrid journals, on the order of 2%. In a more recent article,[6] he notes that the number of open access articles amongst major publishers employing the hybrid model increased as large research organizations, especially in Europe, encouraged open access and supported the associated article processing fees, even though many favor full open access journals. As institutional repositories on the Internet have gained strength and popularity, however, some publishers have tightened their restrictions for posting on third-party sites and implemented embargo periods. Both of these restrictive policies, of course, are in opposition to the open access vision.

*Optical Engineering*'s hybrid open access policy is very liberal in these respects. For an open access fee of $960 per paper, which is less than the publication cost, the manuscript is published under a Creative Commons attribution license (CC BY) that allows anyone to copy, distribute, adapt, and use it if properly attributed. In this case, referred to as "gold open access" in the publications world, the authors maintain copyright to the research article. Authors who do not choose to pay for gold open access are still authorized by the longer-standing SPIE green open access policy to post their articles on a server controlled by themselves or their employers, thus making them accessible to nonsubscribers. Furthermore, free access under SPIE copyright is granted with no charge for tutorial and review papers.

The data suggest that the hybrid open access model under which *Optical Engineering* has operated for roughly the past

five years has been moderately successful and stable. The percentage of open access papers is in the 10-20% range, with a high of 23% in 2013, low of 10% in 2016, and a modest increase to 14% so far this year. Open access papers realized about an 8× increase in downloads relative to traditional papers in the 2014–2016 time frame and nominally a 30% greater citation rate for 2013–2014. Given the great variability in citation impact amongst the various studies, it is difficult to compare the academic impact of *Optical Engineering* open access papers to other journals in the optical engineering field. It is clear, however, that the policy is achieving the goal of uninhibited accessibility for authors who choose open access.

The SPIE Board of Editors and Publications Committee regularly assess the progress and consider the future direction of the open access policy for *Optical Engineering* and the nine other SPIE journals. For the *Journal of Biomedical Optics* and *Neurophotonics*, SPIE has recently decided to move to a full open access model. For *Optical Engineering,* however, we seem to have learned that only a minority of the authorship see value in open access while the majority still prefer the traditional subscription-based model, even given the reasonable open access fee and liberal open access policy. The demand does not appear likely to increase dramatically in the near term, and our hybrid model allows us to be driven by the demands of our constituency, providing a choice for our authors. Maybe this does not fully respond to the idealistic vision of the Budapest conference, but it does provide a practical and sustainable publication model responsive to the broad and diverse international community that *Optical Engineering* serves. While we will continue to run the experiment, it may have reached a steady state that represents a reasonable balance between the needs of our prospective authors and readers. I welcome your views on whether we should consider a different approach.

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Editor-in-Chief

## *References*


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