Open Access to Scholarly Literature in Materials Science

Current Trends and Future

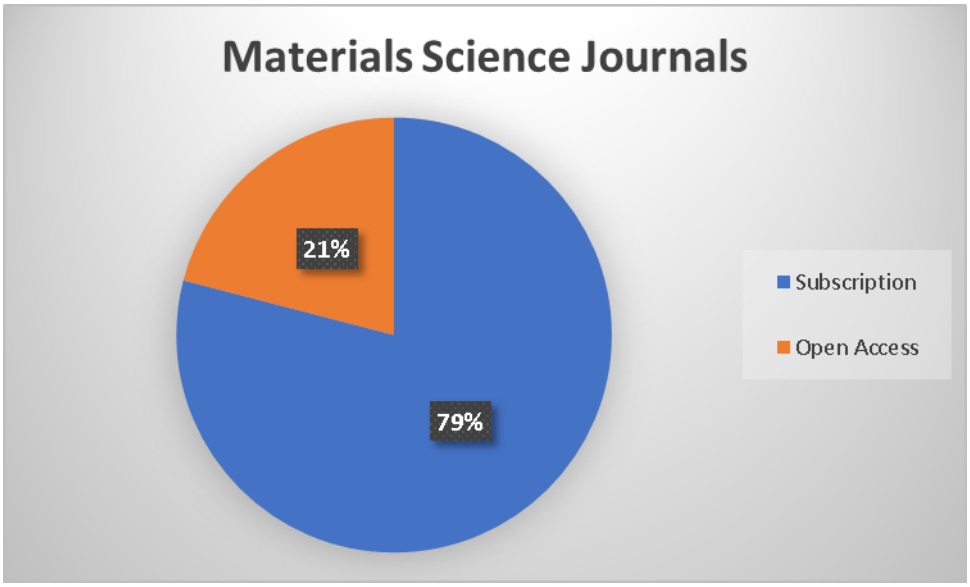
Term Paper for PS 221; Nidhish Sagar, 14414

Introduction: Materials Science is a field which deals with understanding the relationship between structure and property of materials. Further, materials engineers can design a structure to get the set of desired properties.

Research question(s): To determine the extent of use of OA in Materials Science and predict trends for the present and near future.

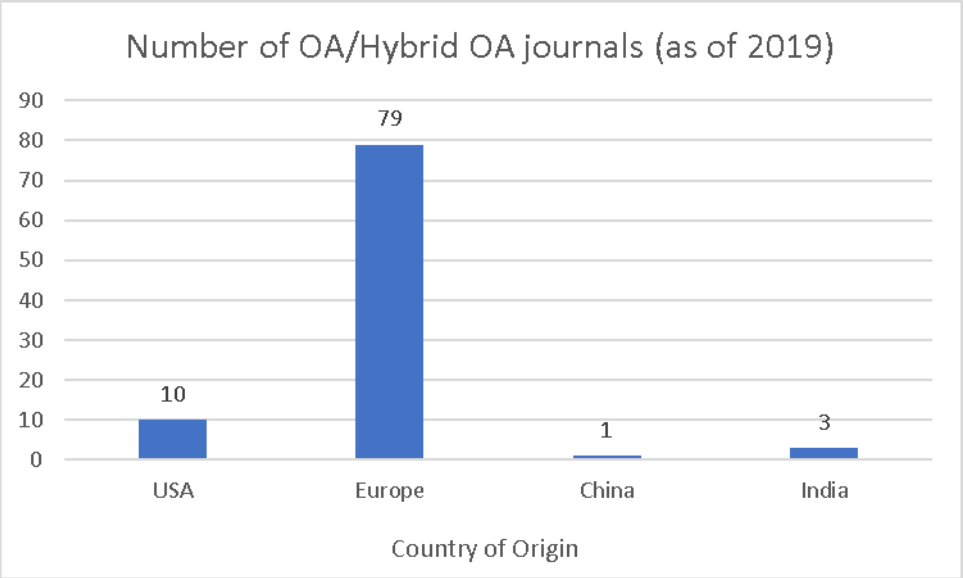
Methodology and Arguments:

There are 625 journals listed in the Scopus database (2019) for the subject of materials science. The split below shows the dominance of subscription-based journals over OA.



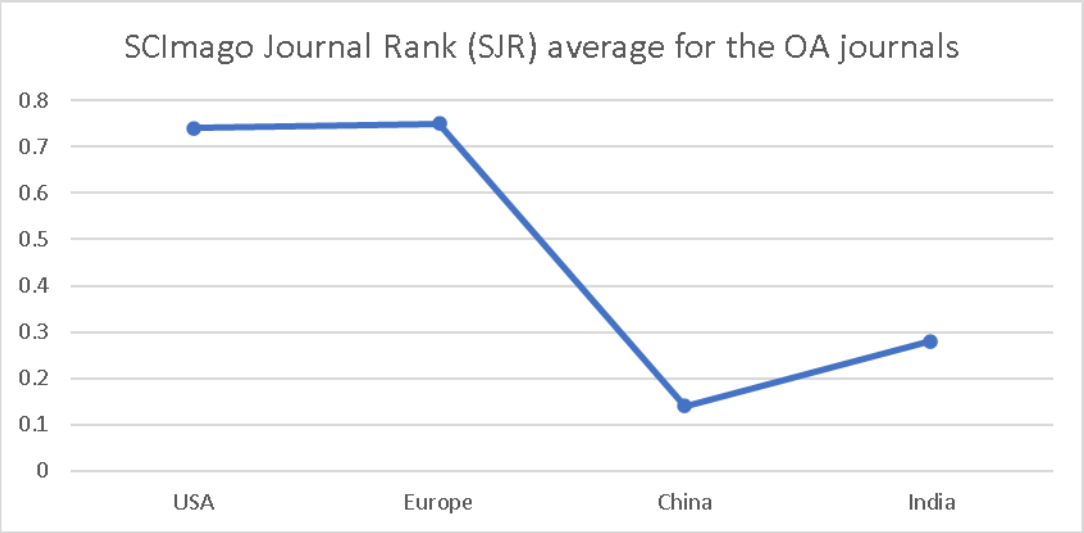
(1)

One reason for such an uneven split may be because OA revolution is far more recent compared to the established subscription-based model.



(2)

We see that Europe is far ahead in terms of supporting Open Access based journals. One of the major driving forces has been pressure from European funding agencies (both private and public) to make research open access. Nevertheless, the huge European Publishing industry survives by choosing the Gold Open Access route.



(3)

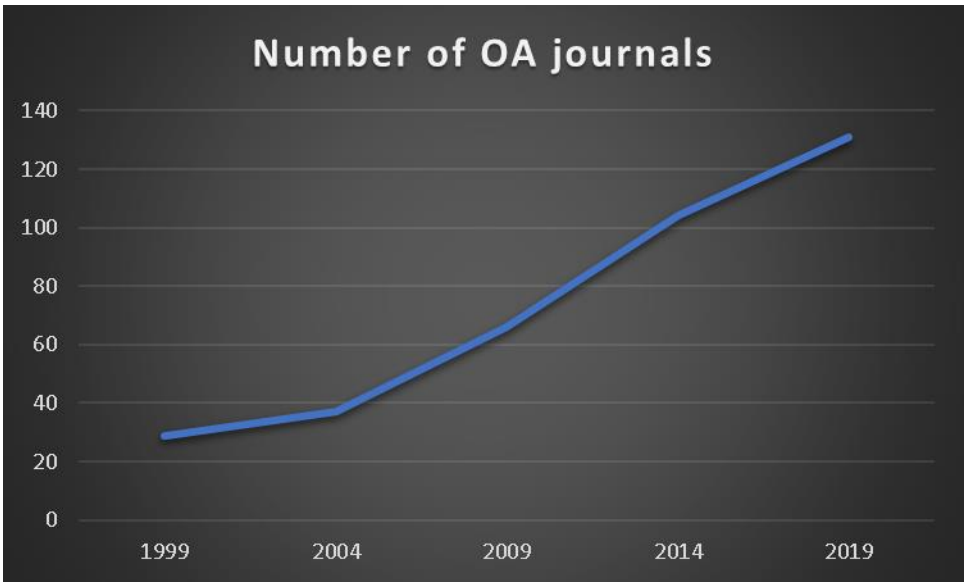
How is SJR calculated? (SJR is an alternate to Impact Factor)

SCImago Journal Rank is a value given to a journal based on the number of citations it receives and the prestige of the journals from where such citations come from.

Hence a higher SJR value indicates that articles in that journal are of higher importance to the scientific community. Example: If a *Nature* article cites my paper, the citation will carry a higher weight. Hence, SJR uses the concept of **weighted citations.**

This value is calculated from an iterative algorithm which distributes prestige values among journals until a steady state solution is reached.

We find that American and European OA journals have far more SJR compared to their Asian counterparts (Fig 3). This is not surprising, given the fact that most top researchers in any country choose to publish their articles with well-established journals based in the US/UK to maximize quality readership.



(4)

The number of materials science OA journals have been rising consistently since the past 2 decades, signaling a positive shift in publishers' interest in making articles open access. But a not-so-good trend is the fact that majority of these are **Gold Open Access**.

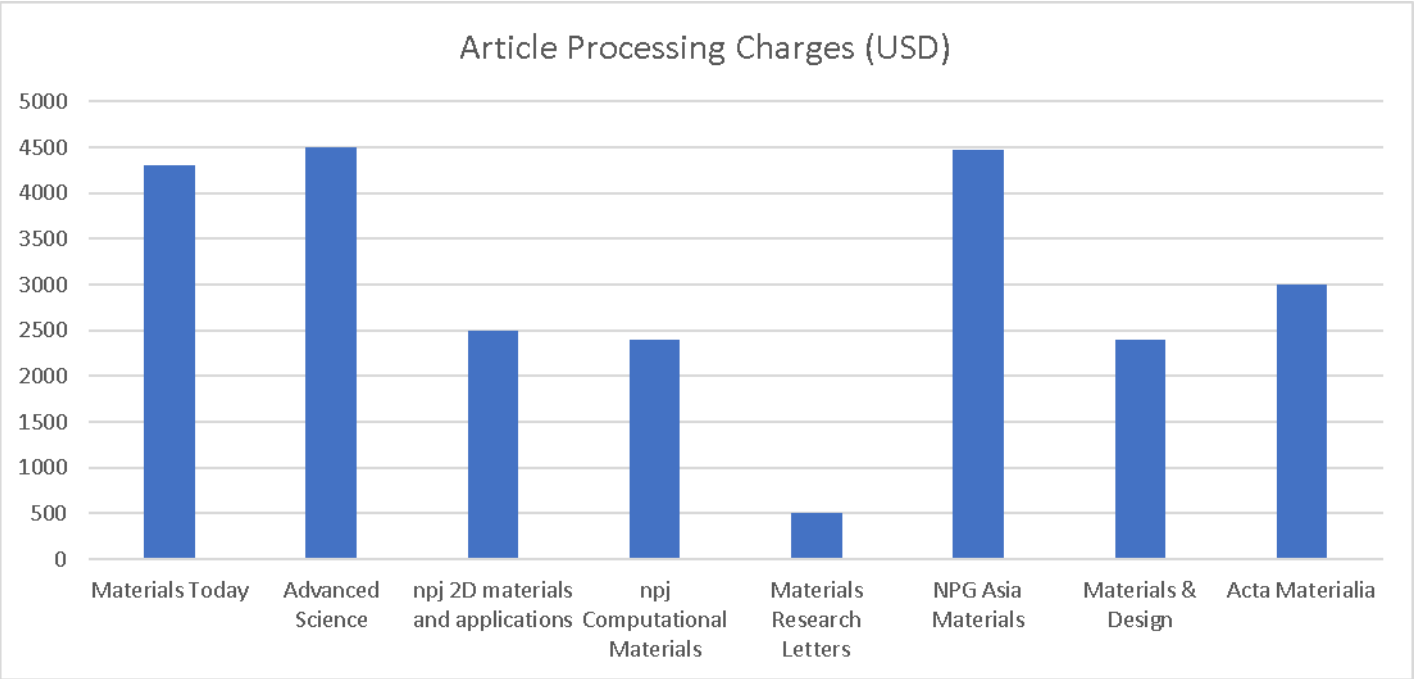
The condensed matter section on arXiv is the major source of **Green OA** in the field. arXiv was founded by Paul Ginsparg in 1991 and is now maintained by Cornell Tech. It is well funded by major universities across the world. Many Computational Materials and Condensed Matter scientists are "arXiving" their articles before sending them to peer-reviewed journals these days.

Details of 8 well-known **Open Access** journals in Materials Science

Name of Journal	Impact Factor	Journal Year of Birth	Publisher
Materials Today	26.4	1998	Elsevier (Hybrid Gold OA)
Advanced Science	15.8	2014	Wiley-VCH (Gold OA)
npj 2D materials and applications	9.3	2017	Nature Research (Gold OA)
npj Computational Materials	9.3	2015	Nature Research (Gold OA)
Materials Research Letters	6.6	2013	Taylor & Francis (Gold OA)
NPG Asia Materials	8.1	2009	Nature Publishing Group (Gold OA)
Materials & Design	6.3	1980	Elsevier (Gold OA)
Acta Materialia	7.6	1953	Elsevier (Hybrid Gold OA)

(5)

Cost of publishing in the above 8 Gold OA journals:



(6)

As we see, it is very expensive to publish in these well-read OA materials journals. Researchers with big pockets can afford them, but majority of scientists/teachers from Tier-2 and below institutions will not be able to, with their research grants.

A study by Malaysian researchers[1] indicates that Open Access journals garner more citations compared to non-OA. They also find that within OA journals, it is not worth paying higher publishing fees to some over others, as there is minimal gain in terms of increased number of citations. (This study was done across all fields, not specific to materials science).

According to the above study, it should not make much difference (in terms of citations) if we publish in Materials Research Letters compared to NPG Asia Materials.

But we should remember that cost is not the only factor which drives researchers to a particular journal. They want to publish in journals which have a readership they desire. Some also look out for lesser embargo periods and easier Copyright licenses.

What the **future** holds:

- Looking at the trends over the past 2 decades, it is safe to say that the number of OA journals in the field of Materials Science will continue to be on the rise. It might continue this trend until OA reaches 50% of the total journals published in the field.
- Green OA (arXiv) is also growing in proportion, with around 50 articles submitted everyday in the condensed matter section. I believe that many materials researchers (even the chemistry inclined folk) will begin using arXiv in the coming years. Reason: as journals get more expensive and longer to publish, researchers may look to play safe by making a pre-print accessible.
- Newer forms of OA like Bronze* OA may play an important part in the future as it offers flexibility for publishers.
- Overlay Journals, which source content from pre-print repositories will be important, as they will be dealing with the latest developments in the field in real-time. If pre-prints start growing exponentially in the near future, we could see traditional journals turning into Overlay Journals to get the necessary content.

*Bronze Open Access: The articles are available on publisher's websites either immediately or following an embargo, but are not formally licensed for reuse. https://www.natureindex.com/news-blog/bronze-open-access-supersedes-green-and-gold

References:

1. Chua S, Qureshi AM, Krishnan V *et al.* The impact factor of an open access journal does not contribute to an article's citations [version 1; peer review: 2 approved]. *F1000Research* 2017, **6**:208 (https://doi.org/10.12688/f1000research.10892.1)
2. Data source for the figures in this report are obtained from the Scopus database: SCImago, (n.d.). SJR — SCImago Journal & Country Rank [Portal]. Retrieved *14th May 2021*, from http://www.scimagojr.com
3. A nice site to check how published articles can be shared, taking into consideration, the journal's policies: https://www.howcanishareit.com/