

A Call For Excellence

From the September 1999 issue of Transactions on Electron Devices

OVER the years we have observed a disturbing trend of submissions not referencing prior work adequately. This trend undermines the publication quality for all concerned. Firstly, it is unfair to the researchers who made initial contributions to the field. Secondly, it gives a distorted view of the topic to the reader who may be unfamiliar with the topic. Most importantly, it demonstrates that the author is not aware of prior art in their area of research. Hence, there may be significant room for further improvement in the technical quality of the submission. We have found very little correlation between this lack of rigor and the absence of library facilities accessible locally. One of the benefits of the information age is the ready availability of technical material online. IEEE's online periodicals and research area (OPeRA) database is one of several such services available free to all IEEE members.

Effective immediately, all subject editors will be paying special attention to the line item on the confidential review form regarding the adequacy of referencing. A new manuscript rejection category is now being added citing inadequate referencing as grounds for manuscript rejection. Authors should remember that pages devoted to citations are not counted against the total page count of a manuscript. We expect these measures will propel the TRANSACTIONS to heightened standards of *excellence* and *quality*.

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Proper Referencing of Prior Art

In September 1999 we had published an editorial [1] in IEEE Transactions on Electron Devices emphasizing the need for authors to pay special attention while referencing previously published related information. As I had mentioned at that time, omitting related work is not only unfair to researcher(s) who have made earlier contributions to the field but it also gives a distorted view of the topic to the reader. More importantly, it demonstrates author's lack of knowledge of prior art in their area of research. Hence, there may be significant room for improvement in the technical quality of the manuscript.

Since then we have continually sensitized the authors to this important issue before adopting the following measures. Every year, Electron Devices Society confers its prestigious Paul Rappaport and the more recent George Smith [2] awards for best papers published in our flagship publications IEEE Transactions on Electron Devices and Electron Device Letters respectively. To reward proper citation philosophy in EDS publications, we have now instituted clear guidelines to take this factor into account in the paper selection process for these awards. Also, we have tightened up the manuscript review process for both T-ED and EDL to make incomplete citations as grounds for rejection.

Another related development worth noting is the publication of EDS archival DVD. In the not so old days, literature search was a major undertaking. One had to physically visit a library, locate the bound volume and make a photocopy of the article. To help relieve this arduous task of

information search and retrieval, in December 2004 we published an archival DVD. This DVD [3] includes all issues of T-ED from 1954 to August 2004, all issues of EDL from 1980 to August 2004 and all technical digests of the International Electron Devices Meeting from 1955-2004. Later issues are available on IEEE XPLORE. All articles are in fully searchable PDF format. Since EDS publications capture a *substantial* portion of *important* publication activity in the field of electron devices, this DVD should greatly facilitate the referencing process.

A question worth addressing is what constitutes a professional, ethical and thorough citation philosophy and under what conditions one *may not* have to cite prior art. In most cases the answer is rather obvious. For example Ohm's law is *common knowledge*, can be found in *most* text -books, and hence should be used without citation. Next, let us look at some other illustrative examples. Consider the patent disclosed by Shockley dealing with ion implantation [4] in 1954. If a paper discusses a new method of doping semiconductors, it is obligatory to refer to ion implantation and to Shockley's original patent. Absence of ion implantation in the discussion can result in several shortcomings. First, it will give the reader an incomplete view of the current state-of-the-art in the field. Second, proposing a new technique of doping semiconductors without knowledge of ion implantation and its strengths and weaknesses would make the contribution amenable to straightforward enhancement. Discussing ionimplantation but not referring to the original patent is unfair to the original contributor. On the other hand if a paper deals with optimizing the doping profile in a junction it may not be necessary to quote Shockley. Let us dig deeper to bring home a subtle point. Let us suppose that an author publishes paper A in the year 2005 on ion-implantation properly citing Shockley and subsequent related work in the field. It would be viewed as highly unethical to restart the clock as of 2005 by solely referring to author's own work in all future papers dealing with this topic even if they are extensions of paper A. This would give a false impression to a novice that the author is the pioneer in the field since nothing ever took place before 2005.

How about topics are related but not the same? Consider the work done by van der Ziel on thermal noise in JFETs [5] in 1962. If a paper, deals with flicker noise in JFETs it may not be necessary to quote van der Ziel although it would be desirable. If however the paper deals with calculation of thermal noise in a newly invented device, referral to van der Ziel's original contribution will demonstrate the breadth of author's knowledge bringing the author more credibility and respect. Further, the author will be recognized for the fact that he/she has already assimilated van der Ziel's contributions and wherever possible, the current work takes advantage of this knowledge.

It must also be emphasized that in addition to original contributions, key developments thereafter that impact the current research should not be ignored either. Also, discussion of results from competing research groups that are either at odds or support the current findings constitute a well-written manuscript. Such practices will create a healthy environment where prior knowledge is leveraged to its fullest extent. This will shorten R&D cycles and accelerate the pace of knowledge creation and economic growth. Also it will result in proper credit being given to where it is due, resulting in a win-win situation for everyone involved.

References

- [1] R. P. Jindal, "A Call for Excellence," *IEEE Transactions on Electron Devices*, vol. 46, pp. 1817, Sep. 1999.
- [2] R. P. Jindal, "George E. Smith award," *IEEE Electron Device Letters*, vol. 23, pp. 445, Aug. 2002.
- [3] R. P. Jindal, "EDS Announces its Archival Collection on DVD", *IEEE Electron Devices Society Newsletter*, vol. 12, pp. 3-4, Jan. 2005.

- [4] W. Shockley, "Forming Semiconductor Devices by Ionic Bombardment," US Patent 2787564., 1954.
- [5] A. van der Ziel, "Thermal noise in field effect transistors", Proc. IRE, **50**, pp. 1808-1812, Aug 1962.

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