letters

Noncrystalline semiconductors

Hellmut Fritzsche has performed a useful service in reviewing much of the recent scientific literature on noncrystalline (particularly amorphous) semiconductors (October, page 34). His treatment of the historical background of this field, however, unfortunately omits some significant references and contains some dubious ascriptions.

His reference to "the inventive drive that utilizes the unique properties of amorphous semiconductors and that gave this field its original momentum" is to Stanford R. Ovshinsky, in *Physical Review Letters* **21**, 1450 (1968). While the publication of this letter provoked a large increase in research activity in the field and helped bring it into the mainstream of solid-state physics, it is also true that, by 1968, two multibillion-dollar industries had already profited for some 20 years from the introduction of amorphous photoconductors into the field of office copiers[1] (1948) and television camera tubes[2] (1951).

The 1968 paper by Ovshinsky describes an electrical switch using amorphous materials. It was described in the *New York Times* as comparable in importance with the transistor. Nevertheless, its commercial impact at the time was minimal and now appears to have practically disappeared. The commercial impact of the amorphous photoconductors in office copiers and television camera tubes, on the other hand, has been outstanding and continues, even after almost 40 years, to increase.

Perhaps the most unfortunate omission in the paper by Fritzsche is any mention of the first demonstration of a solar cell (1976), by David E. Carlson and Christopher R. Wronski using hydrogenated amorphous silicon.[3] This paper initiated a worldwide effort on the science and technology of amorphous silicon. Carlson's and Wronski's contribution was recognized in 1984 by the IEEE with the award of the prestigious Morris Liebmann Prize. Fritzsche himself, on an earlier occasion, paid tribute[4] to this work.

In brief, Fritzsche's treatment of the historical aspects of amorphous materials in the PHYSICS TODAY article is not in keeping with his knowledge and standing in the field.

References

1. R. M. Schaffert, C. D. Oughton, J. Opt. Soc. Am. **38**, 991 (1948).
2. Series of papers by P. K. Weimers, S. V. Forgue, A. D. Cope, R. D. Goodrich, in the September 1951 issue of RCA Review.
3. D. E. Carlson, C. R. Wronski, Appl. Phys. Lett. **28**, 11 (1976).
4. H. Fritzsche, J. Non-Crystalline Solids **59**, **60**, 1289 (1983).

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THE AUTHOR COMMENTS: I am grateful to Albert Rose for giving me the opportunity to point out the tremendous impact that the first amorphous silicon solar cell of David E. Carlson and Christopher R. Wronski had on our field. I do not know how it is possible that I omitted mentioning this important milestone in my article on noncrystalline semiconductors. I very much regret this mistake and apologize.

With regard to the use of noncrystalline semiconductors in xerographic office copiers and television camera tubes, I have often wondered why some materials applications strongly stimulate materials research while others do not. The reversible and very fast switching effect described by Stanford R. Ovshinsky in his *Physical Review Letter* made a strong impression on many of my colleagues, and on me, because we realized how little we knew about this huge class of materials of which these noncrystalline semiconductors are only a part. It changed the direction of our research because of its intellectual challenge and not because of its commercial utility.

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Superpolymers

The excellent article on superpolymers and colloidal aggregates by Tom C. Lubensky and Philip A. Pincus in a recent issue of PHYSICS TODAY (October, page 44) draws attention to a growing area of research[1] on supramolecular