to see such problems as both a challenge and an opportunity, finding ways to overcome them and, at the same time, taking advantage of them. The weak pinning force and the granular nature of HTS when it is not demonstrated under optimal conditions pose serious obstacles to large-current applications. Yet they provide great opportunities for those working on magnetic field sensors and field effect HTS multiterminal device applications, as demonstrated by Sharp (*11*) and by us (*12*), respectively, not to mention for many other potential applications that do not require a large J_c. Whether something is a problem or an opportunity depends largely on the ingenuity and far-sightedness of the executor. With the great intellectual challenges and technological opportunities that HTS has put before us, the HTS party has just begun.

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REFERENCES

1. B. Roas, L. Schultz, G. Endres, paper presented at the European MRS Conference, Strasbourg, France, 8 to 10 November 1988.
2. K. Salama, V. Selvamanickam, L. Gao, K. Sun, *Appl. Phys. Lett.* **54**, 2352 (1989).
3. H. Hitotsuyanagi, K. Sato, S. Takano, M. Nakata, paper presented at the 39th Electronic Components Conference, Houston, TX, 22 to 24 May 1989.
4. R. H. Koch, W. J. Gallagher, B. Bumble, W. Y. Lee, *Appl. Phys. Lett.* **54**, 951 (1989).
5. P. L. Gammel *et al.*, *Phys. Rev. Lett.* **59**, 2592 (1987).
6. X. D. Wu *et al.*, *Appl. Phys. Lett.* **52**, 754 (1988).
7. S. Otsubo *et al.*, *Jpn. J. Appl. Phys.* **27**, L2442 (1988).
8. T. Hirai *et al.*, paper presented at the ISEC89 Conference, Tokyo, Japan, 12 and 13 June 1989.
9. H. Küpfer, C. Keller, K. Salama, V. Selvamanickan, in preparation.
10. M. Murakami and N. Koyama, paper presented at the ISTEC Workshop on Superconductivity, Tokyo, Japan, 1 to 3 February 1989.
11. H. Nojima, S. Tsuchimoto, S. Kataoka, *Jpn. J. Appl. Phys.* **27**, 746 (1988).
12. W. K. Chu, Y. J. Zhao, Z. H. Zhang, in preparation.

We take strong exception to Pool's Research News article "Superconductivity: Is the party over?". The main conclusion of this article is based largely on the acknowledged failure of the research community to produce flexible cables from high T_c superconductors with sufficiently high current carrying capability (technical parameter, low J_c) in the presence of high magnetic fields. Such cables are required for many high-power applications envisioned for superconductivity. On the basis of the assertion by some physicists (*1, 2*) that the low J_c values are in fact intrinsic in high-temperature superconductivity because they are caused by a new and thermodynamically justified phenomenon called flux lattice melting, Pool concludes that the "once high hopes for high-temperature superconductivity are nearly gone."

Much more carefully reasoned and balanced statements of the status of superconductivity have been made (*3*). It is now clear that high-field, high-power applications of superconductivity will continue to use the conventional low-temperature materials for near-term applications while researchers investigate and solve the problems of flux dynamics, granularity, anisotropy, and small coherence lengths that now limit the critical current of the high-temperature materials in magnetic fields. On the other hand, low-field, low-power applications, such as SQUID magnetometers, high-frequency electronic devices, low-field magnetic shields, and low-power microwave cavities, may be viable near-term applications for the new high-temperature materials.

It is not universally agreed that flux lattice melting occurs, in spite of the picture of the bismuth superconductor shown with Pool's article (p. 915), which shows some smearing. It appears to us that the magnetic fields are different in the two photographs shown because the average spacing of the vortices seems to be quite different. The spacing, r, is independent of material; it is given by the expression $(\theta_0/B)^{1/2}$ where θ_0 is the quantum of magnetic flux and B is the magnetic induction. The intervortex repulsive energies that cause the Abrikosov lattice to form increase logarithmically with the ratio of the superconducting penetration depth and the average distance between vortices, r. Therefore, the lattice gets much stiffer as the magnetic field is increased toward the upper critical field. It is thus rather improbable that this very stiff lattice melts below the upper critical field H_{c2}, as Gammel *et al.* (*1*) propose. (By the way, the picture accompanying Pool's article was presumably taken at 20 gauss, very far from where Gammel *et al.*'s vibrating reed experiments would have indicated that melting had occurred.)

It is possible that at high fields and high temperatures the effective pinning potential provided by crystal defects is overwhelmed by the depth of the energy minimum of the Abrikosov structure (especially for single crystals and very high-quality films). The flux lattice therefore may be able to move in and out of these materials as a unit. This would show up as nearly total reversibility when measured by magnetization or as nearly ideal flux flow resistance when measured by transport. A vibrating reed experiment would show the transition to a large amount of dissipation as the vortex lattice became totally free to move. All this really proves, however, is that we have not learned how to effectively pin the lattice in the regime that was inaccessible with conventional superconductors. Our future efforts should be directed toward finding a pinning defect that can be introduced in a large enough density so that the average distance between the pinning sites is comparable to the vortex lattice spacing at the magnetic field of interest. Also, line defects rather than point defects might provide a more effective pinning barrier in those materials in which the coherence length is short.

The techniques for providing the high density of effective pinning sites for the conventional superconductors like NbTi and Nb_3Sn took many years. Those of us who have devoted our careers to this field and who are in the game for the long-term feel that the party is *not* over; indeed it has barely just begun!

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REFERENCES AND NOTES

1. P. L. Gammel *et al.*, *Phys. Rev. Lett.* **61**, 1666 (1988).
2. D. R. Nelson, *ibid.* **60**, 19 (1989).
3. *Navy Five Year Plan*, available from D. U. Gubser, Code 6300, Naval Research Laboratory, Washington, DC 20375–5000.

Notification to Readers

The editors of *Science* have been notified by the National Institutes of Health of the conclusion of an investigation of a paper by C. David Bridges and Richard A. Alvarez entitled "The visual cycle operates via an isomerase acting on all-*trans* retinol in the pigment epithelium" [*Science* **236**, **1678** (**1987**)] and a paper by Paul S. Bernstein, Wing C. Law, and Robert R. Rando entitled "Isomerization of all-*trans*-retinoids to 11-*cis*-retinoids *in vitro*" [*Proc. Natl. Acad. Sci. U.S.A.* **84**, **1849** (**1987**)]. The NIH panel concluded that "Based on this analysis of the published articles, the NIH panel believes that Dr. Bridges did plagiarize the Bernstein-Law-Rando manuscript: he misused the privileged information available to him in formulating the experiments he allegedly conducted and he failed to acknowledge properly the source of that information in his report in *Science*."