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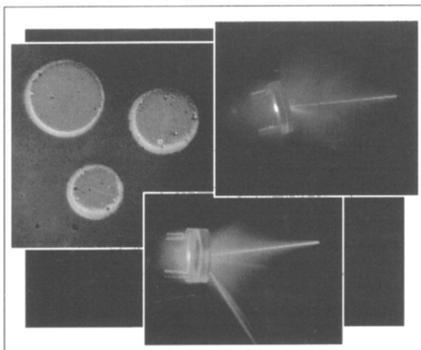
Stability of Microstructure in Metallic Systems, 2d ed., J.W. Martin, R.D. Doherty, and B. Cantor, reviewed by I. Baker; *The Substance of Civilization: Materials and Human History from the Stone Age to the Age of Silicon*, S.L. Sass, reviewed by R. Gahn; *Reflection Electron Microscopy and Spectroscopy for Surface Analysis*, Z.L. Wang, reviewed by P.M. Ajayan and V. Ravikumar.

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ON THE COVER: Diffraction of blue (488 nm) (Top Right) and green (514.5 nm) (Bottom Right) laser beams by a photonic crystal prepared from a crystalline face-centered-cubic array of polystyrene colloids.

(Left) Photonic-crystal chemical-sensing material. The photonic crystal normally diffracts violet light. The presence of three drops of a lead solution swells the photonic crystal and shifts the diffracted color to red. This is an example of a new chemical sensing motif.

For more information, see the article by S.A. Asher et al. on p. 44 of this issue.



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The Society's interdisciplinary approach differs from that of single-discipline professional societies because it promotes information exchange across the many technical fields touching materials development. MRS sponsors two major international annual meetings encompassing approximately 70 topical symposia, and also sponsors numerous single-topic scientific meetings. The Society recognizes professional and technical excellence and fosters technical interaction in local geographic regions through Sections and University Chapters.

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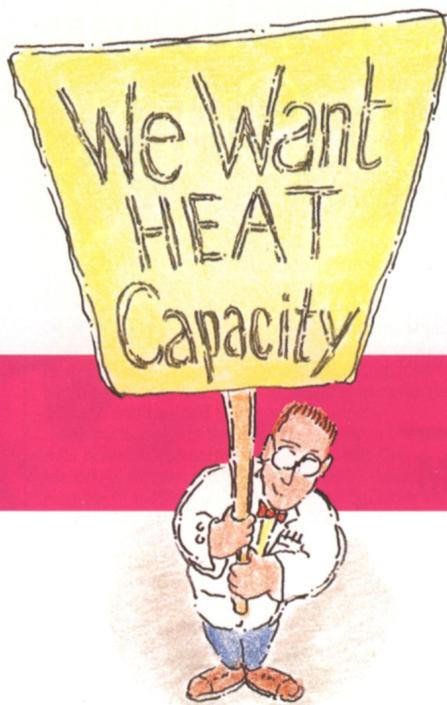
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Diamond-tipped polymer for contact lenses.
Sample courtesy DAC Vision, 50µm.

Background: MFM image of a $\text{Fe}_{20}\text{B}_{16}\text{Si}_4$ ribbon revealing stress-induced magnetic structure that can lead to power losses in electrical transformers, 30µm scan courtesy M.E. Hawley, Los Alamos National Lab

*Sample courtesy A.P. Shilov,
Moscow State University, 25µm



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Introducing the world's first Smart Heat Capacity System,

built on the proven architecture of Quantum Design's popular Physical Property Measurement System (PPMS). This system is designed with three things in mind: extraordinary functionality, a high degree of accuracy, and unprecedented ease of use.



Sample mount: Heater and thermometer are deposited directly on the micro-calorimeter chip for improved sample coupling and reliability.

The Heat Capacity System comes with an intelligent, user-friendly software package which includes built-in data subtraction to correct for the contribution of elements extraneous to the sample. Sophisticated algorithms calculate and report the percent of coupling of the sample to the chip, and this data is used to determine the sample's heat capacity.

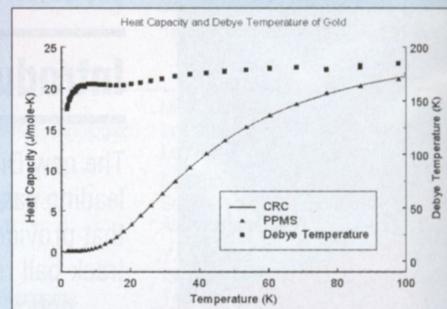
The Quantum Design Smart PPMS Heat Capacity System:

- Automated relaxation micro-calorimetry technique
- Easy sample mounting and introduction into integrated high vacuum system

- Two quantitative values (curve fit and sample coupling) for data quality assurance

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A sophisticated fitting technique called the *two-tau model* enables the system to accurately simulate the effect of heat flow between the micro-calorimeter chip and the sample (τ_1), as well as the heat flow between the chip and the sample mount (τ_2).



Heat capacity of a gold sample on the PPMS in comparison with CRC values. Each triangle is three overlapping symbols, there has been no averaging.

Total Heat Cap	19284 ± 13 μJ/K
Sample Heat Cap	21.02 ± 0.02 J/mole-K
Addenda Heat Cap	1664 ± 0.64 μJ/K
Time Const (tau1)	222.8 sec
Time Const (tau2)	0.2304 sec
Sample Coupling	98.6761 %
Base Samp Temp	96.8987 K
Avg Samp Temp	97.8787 K
Temp Rise	1.9599 K
Fit Quality (Chi Sq)	0.80483
Debye Temp	184.43 ± 0.42 K

Measurement Status Viewer

Substrate Temp (fit) [checked]
Substrate Temp (measured) [checked]
Sample Temp (from fit) [unchecked]
Heater Power (measured) [unchecked]

Temperature (K) vs Time (sec) graph showing a peak at approximately 100 seconds.

Buttons: Append to Data File, Save Time Trace, Pause, Resume, Abort, Close

Measurement Loaded. Fitting...

Heat capacity measurement status window.

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