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ON THE COVER: (Top Left) *In situ* high-pressure scanning-tunneling-microscopy pictures showing adsorbate-induced surface reconstructions of Pt(110) under atmospheric pressures. Surfaces restructure in different ways in the presence of chemisorbed atoms or molecules of different types. The most thermodynamically stable surface structures form under conditions of chemical bonding of the adsorbate layer. The formation of strong chemisorption bonds weakens metal-metal bonds near the adsorption site that facilitate surface atom transport. In addition enhancements to the nature and strength of the adsorbate-substrate bond, adsorbate-induced restructuring is also helped by increased adsorbate coverage. (Courtesy of B.J. McIntyre, M. Salmeron, and G.A. Somorjai, Lawrence Berkeley Laboratory, 1993.) See the article on page 11.

(Top Right) Cross-sectional photographs of lateral overgrowth of GaN on the SiO₂ stripe-shaped mask after (top) 2 and (bottom) 4 h of growth. The lateral overgrown GaN on the mask has no threading dislocations. Conventional GaN grown directly on the sapphire substrate has a threading dislocation density of $1 \times 10^{10}/\text{cm}^2$. See the article on page 37.

(Bottom Left) Planar-flow-cast amorphous-metal ribbon. Amorphous metals are rapidly solidified, noncrystalline materials with unique magnetic, mechanical, and physical properties. Replacing grain-oriented silicon steel as the magnetic core in an electric power distribution transformer, this novel material can reduce the no-load loss of the transformer by 75%. In the United States, amorphous-metal distribution transformers offer the opportunity to save the energy equivalent of 70 million barrels of oil while reducing the volume of harmful CO₂, NO_x, and SO₂ emissions associated with energy production. See the article on page 50.

(Bottom Right) Schematic illustration of ripening. The "Scheil equation" and its various modifications comprise solute balances on "volume elements" such as those shown in this figure. The volume elements are from within the liquid-solid zone of a solidifying casting. The sketch on the left is at an early stage of solidification, and the sketch on the right is at a later stage of solidification. Considerable "ripening" or "coarsening" of the structure occurs during the solidification process. See the article on page 30.

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The Materials Research Society (MRS), a not-for-profit scientific association founded in 1973, promotes interdisciplinary goal-oriented basic research on materials of technological importance. Membership in the Society includes over 12,000 scientists, engineers, and research managers from industrial, government, and university research laboratories in the United States and nearly 68 countries.

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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