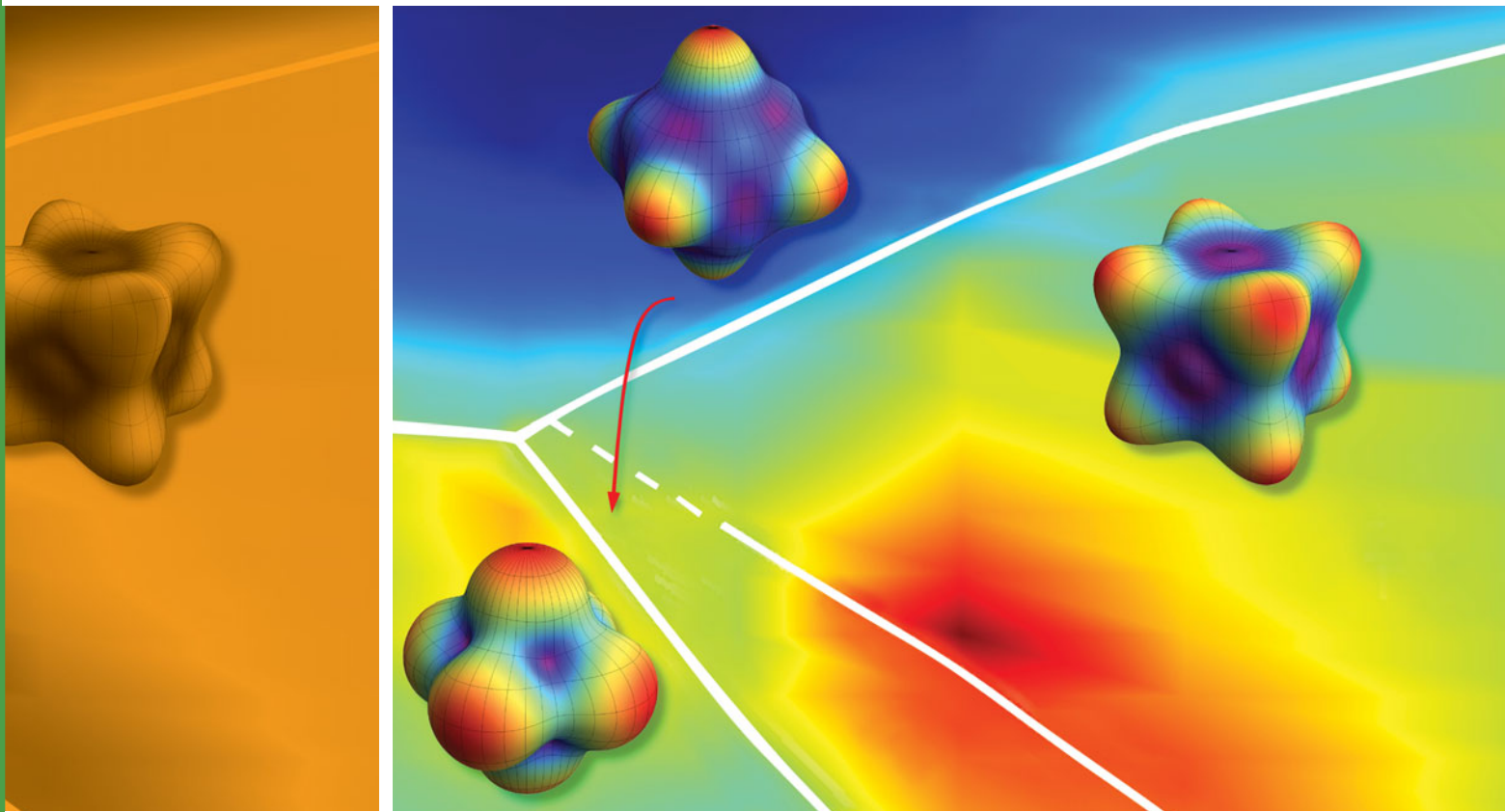


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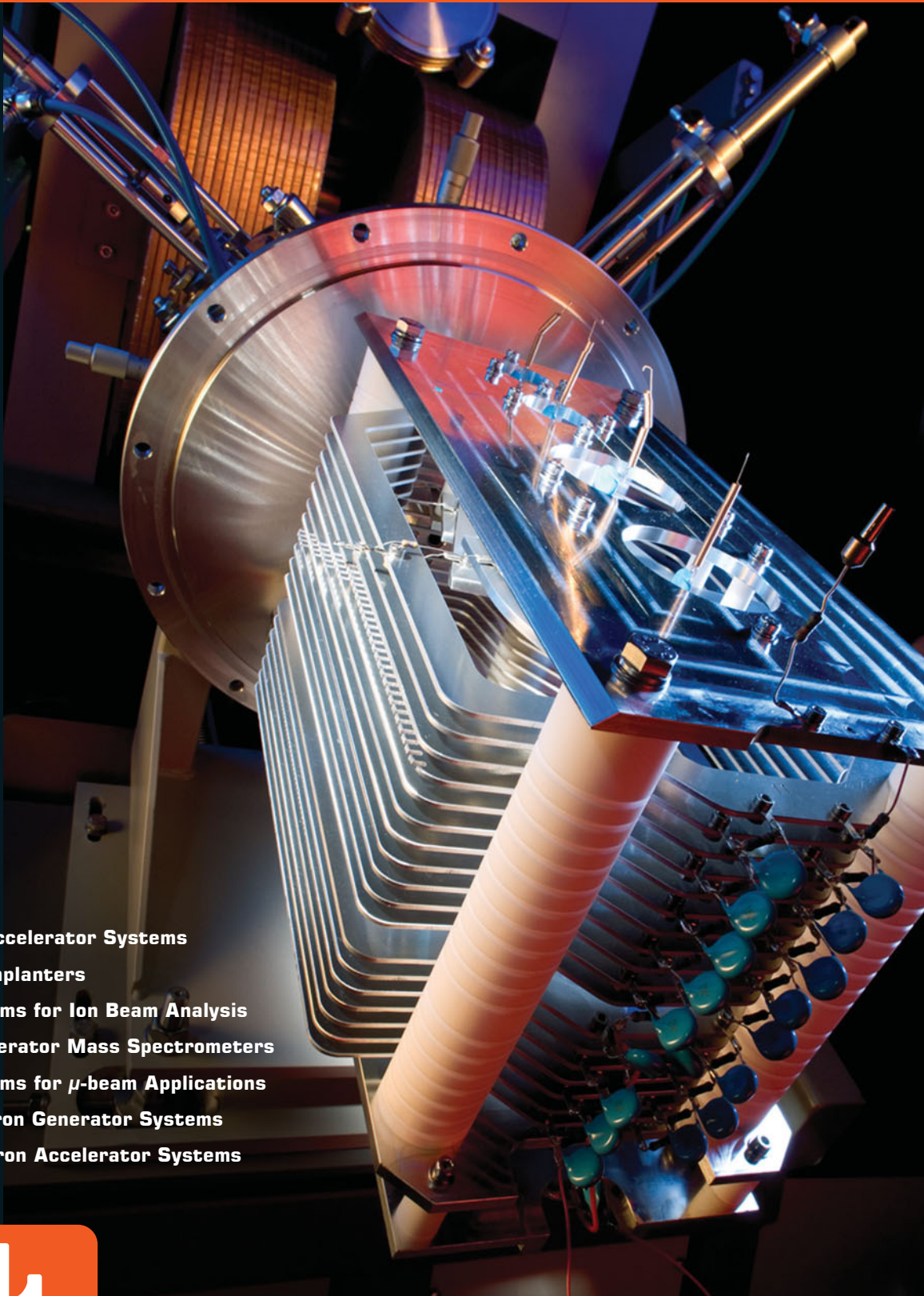
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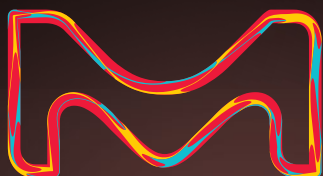
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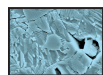
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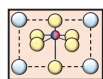
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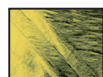
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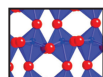
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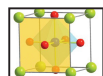
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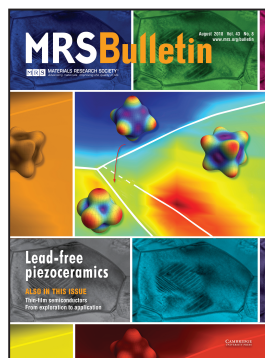


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ON THE COVER

Lead-free piezoceramics. Legislation in Europe and other regions restricting the usage of lead-containing piezoceramics about 15 years ago served as a trigger for stronger efforts into research on lead-free piezoceramics. As a result, avenues have opened for new lead-free materials with properties better than those of lead zirconate titanate (PZT) for select applications, as described in the articles in this issue. The cover image highlights the multiscale nature

of the macroscopic strain response in lead-free piezoceramics, from intrinsic mechanisms involving the motion of atoms within the unit cell to extrinsic mechanisms involving the motion of domain or phase boundaries. A plot of piezoelectric coefficients in the barium calcium titanate—barium zirconate titanate (BCT-BZT) system reveals that the best properties (dark red) occur at the orthorhombic-tetragonal phase boundary (courtesy M. Acosta), which is rationalized employing free energy computations for the three phases involved (courtesy G.A. Rossetti Jr.). The intricate microstructure involved in some of these materials is exemplified in a TEM image of the core-shell domain structure in a BaTiO_3 piezoceramic doped with Bi and Li (courtesy X. Tan). See the technical theme that begins on page 576.

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