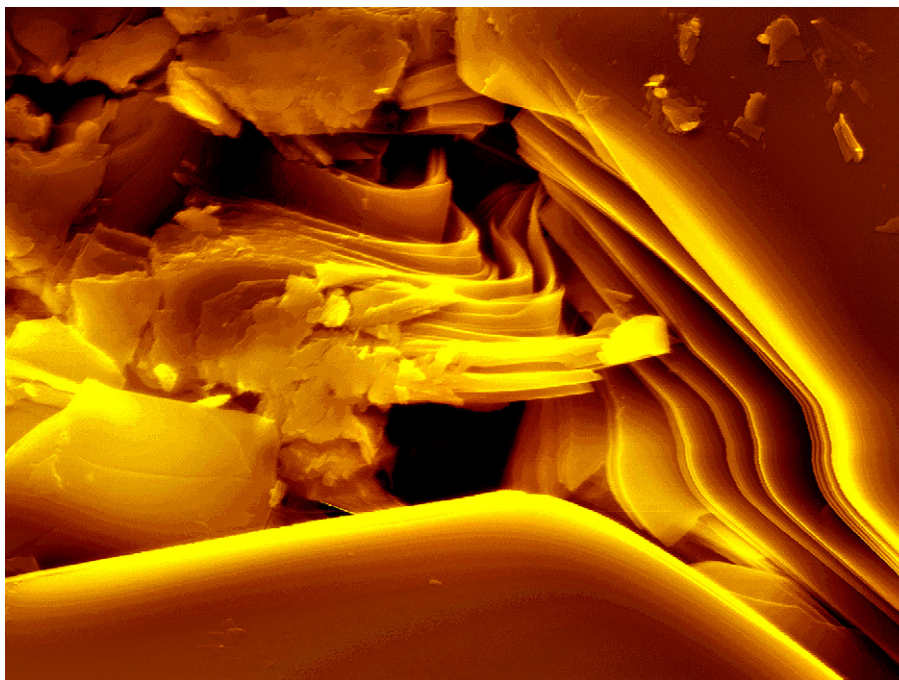




Photograph of the Month

Micro-kinked domains in mica under spherical nanoindentation



The photograph shows a scanning electron microscopy, SEM (XL 30, FEI Corporation, Hillsboro, OR), image of kinked domains in muscovite mica (Custer County, South Dakota – Geoprime Earth Materials Co.), formed under a spherical nanoindenter tip with a radius of 13.5 μm . The width of the photograph is about 8 μm . In mica, during loading, basal plane dislocations form incipient kink bands (IKBs), which eventually sunder into permanent kink bands (KBs) at greater stresses (Barsoum et al., 2004, 2003; Basu et al., 2009). By repeatedly indenting the same location, we demonstrated the role of IKBs in nonlinear elasticity and energy dissipation during the deformation of single crystal mica. The photograph also shows the massive rotation of kinked domains possible: the kink band in the center of the photograph has a different orientation than the domain on the right. Spherical nanoindentation stress–strain analysis (Basu et al., 2006), allowed us to estimate the stresses at which the IKBs and KBs form. This experimental observation should help structural geologists take IKBs into account while modeling the micro-scale deformation behavior of geological formations containing layered silicates.

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