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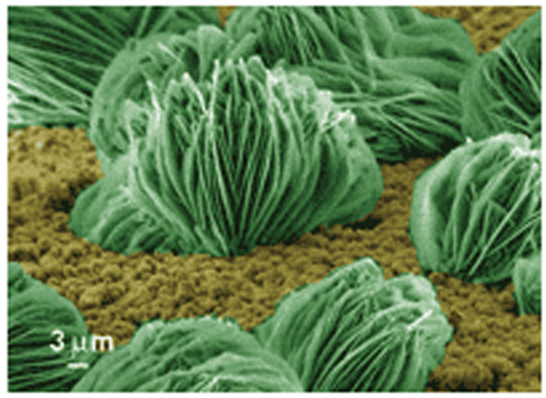
Forsterite synthesis revisited



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Forsterite (Mg_2SiO_4) is a form of the mineral olivine used as an insulator in high-frequency electronics and other applications. When doped with chromium, it is used in laser optics. Forsterite typically is made from MgO and SiO_2 by solid-state synthesis above 1,100 °C. Now, a research team led by Raymond Whitby of the University of Sussex, in England, has devised a lower temperature method to make forsterite that produces leaflike microstructures with a geometric ordering that hasn't been seen before [*Chem. Commun.*, **2004**, 2396]. The team loaded a reaction tube with two separate reactants--a Mg/I_2 mixture and amorphous SiO_2--spaced 20 cm apart. Under a helium atmosphere, the Mg/I_2 powder was heated to 800 °C and the SiO_2 was heated to 600 °C, creating a temperature gradient. Cabbagelike Mg_2SiO_4 crystals formed (shown), as well as catenated crystals that resemble segmented earthworms. The researchers believe MgI_2 is formed as an intermediate species that ferries Mg to SiO_2 nucleation sites, where the forsterite crystals grow. They have shown that the synthesis is reproducible and plan to continue to investigate the nanoscale growth mechanism and to prepare chromium-doped forsterite.

Cross-linking protein matrix directs neuron growth

Neuroscientists often use simplified model systems to study how neurons work. A common approach is to develop cell cultures on a planar substrate and allow a small number of neurons to interact and develop into circuits. The ability to direct the development of neurons in such cultures with micrometer-scale resolution would be a powerful tool. Working toward that goal, Jason B. Shear, associate professor of chemistry and biochemistry at the University of Texas, Austin, and coworkers are using a multiphoton method to excite photosensitizers that promote the cross-linking of various proteins into a matrix from a solution in which neurons are growing [*Proc. Natl. Acad. Sci. USA*, **101,** 16104 (2004)]. "We can create physical structures that cells interact with and respond to," Shear says. Even the simplest cross-linked protein matrices consisting of low-profile lines could be used to redirect the growth of neurons. "We're actively working on adapting this for a more sophisticated system that is a combination of both physical and chemical cues," Shear says.