ring for 1000 s (orders of magnitude longer than typical microfluidic times). Also, the system could be operated as a filter or separator by slowly reducing the contact angle from $\theta > 90°$ to $\theta < 90°$. The capillary length scale (4 mm in the case described) was determined by the ratio of surface tension to gravitational weight. This microfluidic channel width of 4 mm sets the approximate upper size limit; however, as microfluidic sizes shrink, the effect becomes more efficient, and similar behavior was observed over all widths down to 100 µm.

SHILPA SANKHE

Discretely Sized Si Nanoparticles Fluoresce in RGB Colors

Researchers at the University of Illinois at Urbana-Champaign have demonstrated that their electrochemically etched hydrogen-capped silicon (Si_nH_x) nanoparticles ($n > 20$) come in particular sizes (including diameters of 1 nm, 1.67 nm, 2.15 nm, and 2.9 nm) and fluoresce in blue, green, yellow, and red, respectively, with band peaks at ~410 nm, 540 nm, 570 nm, and 600 nm. To convert bulk silicon into nanoparticles, physics professor Munir Nayfeh and his colleagues used an electrochemical treatment that involved gradually immersing a silicon wafer into an etchant bath of hydrofluoric acid and hydrogen peroxide while applying an electrical current. The process eroded the surface layer of the material, leaving behind a network of weakly interconnected nanostructures. The wafer was then removed from the etchant and immersed briefly in an ultrasound bath.

Under the ultrasound treatment, the nanostructure network crumbled into individual particles, which could be easily separated into the different size groups. According to the authors, quantum Monte Carlo simulations indicate that the key to forming these stable configurations is the use of hydrogen peroxide in the etching solution. Although the authors do not have a full understanding yet, it appears that the hydrogen interacts with the Si and etching solution in such a way that formation of certain configurations are energetically favored. As reported in the February 4 issue of *Applied Physics Letters*, the silicon particles fluoresced under ultraviolet light. They also could fluoresce when struck with two photons of infrared light, a technique that could noninvasively penetrate human tissue.

Current medical and biological fluorescent imaging is limited by the use of dye markers, which are not photostable, Nayfeh said. The dyes can break down under photoexcitation, room light, or higher temperatures. The Si particles are photostable and bright.

"By placing particles of different colors in strategic locations, you could study such phenomena as growth factors in cancer cells or how proteins fold," said Nayfeh, who also is a researcher at the UI's Beckman Institute for Advanced Science and Technology.

DNA Strands Control and Fuel Robust DNA Rotary Mechanical Device

A team of researchers at New York University has built a device from synthetic DNA molecules that improves upon previously developed nanoscale DNA devices because it allows for better-controlled movement within larger DNA

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