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Thin film assemblies of silicon nanoparticles roll up into flexible nanotubes SAHRAOUI CHAIEB, Department of Theoretical and Applied Mechanics, University of Illinois at Urbana-Champaign, Urbana, IL 61801, ADAM SMITH, MUNIR NAYFEH, Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801 — We report on synthesis of flexible nanotubes made of a self-assembly of fluorescent silicon nanoparticles. When a colloidal dispersion of the Si nanoparticles in alcohol is submitted to an electric field, the particles are driven to one of the electrodes via eletrophoresis. We coat various surfaces with thin films of silicon particles. Upon drying, the film rolls up into uniform tubes. We used Atomic Force Microscopy (AFM) and a linear elasticity model to measure the young modulus of this film. It was found to be as flexible as rubber. These structures have potential applications for future enhanced biological recognition and sensing of toxins. Moreover, they are useful as catalysts, and in nano robotic applications.

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