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**Phase Behavior of Carbon Nanotube Suspensions**

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We study the phase behavior of nanotube suspensions stabilized by surfactants or amphiphilic polymers. The control of the composition of the solutions allows the interaction potential between the nanotubes to be finely tuned. As a consequence, it is possible to quantitatively analyze important phenomena such as percolation or liquid crystalline phase transitions. In particular, we describe how the percolation of rod-like particles is quantitatively decreased in the presence of attractive interactions (1). We show that rod-like particles respond much more strongly than spheres to attractive interactions; strengthening thereby the technological interest of carbon nanotubes to achieve low percolation thresholds for electrostatic dissipation or electromagnetic shielding. By contrast, carbon nanotubes which experience repulsive interactions can spontaneously order and form liquid crystalline solutions (2). Aligning and packing nanotubes is a major challenge to obtain macroscopic materials with improved properties. We will briefly discuss at the end of the presentation, our latest results concerning the fabrication of fibers aligned nanotubes (3). In particular, we will present new treatments of these fibers which lead to unusual mechanical properties and shape memory effects with giant stress recovery (4).

1. B. Vigolo, C. Coulon, M. Maugey, C. Zakri, P. Poulin, **Science 2005**.

2. S. Badaire, C. Zakri, M. Maugey, A. Derré, J. Barisci, G. Wallace, P. Poulin, **Adv. Mat. 2005**.

3. P. Miaudet, M. Maugey, A. Derré, V. Pichot, P. Launois, P. Poulin, C. Zakri, **Nanoletters 2005**.

4. P. Miaudet, A. Derré, M. Maugey, C. Zakri, P. Poulin, in preparation.