



## Presents

### Processing Carbon Nanotubes: Dispersions and fibers

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**ABSTRACT:** As-synthesized carbon nanotubes are usually under the form of a light and disordered powder. Processing materials of practical use such as films, coatings, mats, fibers, etc is critical for the development of nanotube applications. We describe in this presentation research activities of our laboratory in this field. We study the phase behavior of nanotube suspensions stabilized by surfactants or amphiphilic polymers. We will mainly discuss recent results to show how the percolation threshold of nanotubes can be markedly decreased in response to attractive interactions; strengthening thereby the technological interest of nanotubes for conductive composites. Another research effort of our group is focused on the development of nanotube fibers spun via a simple solvent coagulation method. We will discuss promising properties and potential applications of fibers of highly aligned nanotubes ( $\pm 10^\circ$ ). Their mechanical properties compare well with, or exceed, some characteristics of natural or high performance synthetic fibers.

#### Selected Publications

- 'Evidence for Newton black films in between adhesive emulsion droplets' P. Poulin, F. Nallet, B. Cabane, J. Bibette, **Phys. Rev. Lett.** **77**, 3248 (1996)
- 'Novel Colloidal Interactions in Anisotropic Fluids' P. Poulin, H. Stark, T.C. Lubensky, D.A. Weitz, **Science** **275**, 1770 (1997)
- 'Colloidal ordering from phase separations in a liquid-crystalline continuous phase' J.C. Loudet, P. Barois, P. Poulin, **Nature** **407**, 611-613 (2000)
- 'Macroscopic fibers and ribbons of aligned carbon nanotubes' B. Vigolo, A. Pénicaud, C. Coulon, C. Sauder, R. Pailler, C. Journet, P. Bernier, P. Poulin., **Science** **290**, 1331-1334 (2000)
- 'In-situ measurements of nanotube dimensions in suspensions by depolarized dynamic light scattering' S. Badaire, P. Poulin, M. Maugey, C. Zakri, **Langmuir** **20**, 10367-10370 (2004)
- 'Liquid crystal of DNA stabilized carbon nanotubes' S. Badaire, C. Zakri, M. Maugey, A. Derré, N. Barisci, G. Wallace, P. Poulin. **Adv. Materials** 2005.

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