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Hybrid thermoreversible gels: polymer/self-assembled systems

We present in this talk three types of hybrid materials made up from covalent polymers and supramolecular polymers that form thermoreversible gels and therefore possess fibrillar morphology. Two main cases are shown: i) intermingled gel where the polymer gel and the organogel pervade one another [1], ii) sheathed or jacketed nanowires, where one component trigger the growth of the other by means of a heterogeneous nucleation process [2,3]. The polymers used are isotactic polystyrene, syndiotactic polystyrene, that form polymer-solvent compounds, and poly(3-butylthiophene-2,5-diyl) (P3BT), a semi-conducting polymer, while the self-assembling materials are bicopper-2-éthyle hexanoate complex, that pile up to form long filaments, OPV (oligo phenylene vinylene), that produces an organogel [4], and 3,5-Bis-(5-hexylcarbamoylpentyloxy)-benzoic acid decyl ester (BHPB-10), that form nanotubes [5]. The intermingled network is made up with isotactic or syndiotactic polystyrene and OPV in a common solvent. The encapsulated system consists of the filaments of bicopper-2-éthyle hexanoate complex, an antiferromagnetic molecule, encapsulated in isotactic polystyrene fibrils [2]. The encapsulation is seen to impart new magnetic properties, namely the magnetic susceptibility is no longer 0 at T= 0 K [6]. Sheathed systems comprise isotactic polystyrene fibrils sheathed by BHPB-10 nanotubes [4,5], as well as (P3BT) jacketed by the same nanotubes. In the latter case insulated nanowires are obtained [7]. Results on the formation thermodynamics, the morphology and the molecular structure will be presented. All the experimental results show that a high degree of compatibility exists between all the components thus allowing one to prepare materials where one component is finely dispersed within the other. Their functional properties as studied by SQUID and conducting AFM (C-AFM) will also be presented.

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Preferred topic

Gels and nanoparticles

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