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(54) **SELF-ASSEMBLY OF NANOCOMPOSITE MATERIALS**

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(51) **Int. Cl.**⁷ **C30B 11/10**

(52) **U.S. Cl.** **117/11; 117/68; 117/70**

(58) **Field of Search** **117/11, 68, 70**

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(57) **ABSTRACT**

A method of making a nanocomposite self-assembly is provided where at least one hydrophilic compound, at least one hydrophobic compound, and at least one amphiphilic surfactant are mixed in an aqueous solvent with the solvent subsequently evaporated to form a self-assembled liquid crystalline mesophase material. Upon polymerization of the hydrophilic and hydrophobic compounds, a robust nanocomposite self-assembled material is formed. Importantly, in the reaction mixture, the amphiphilic surfactant has an initial concentration below the critical micelle concentration to allow formation of the liquid-phase micellar mesophase material. A variety of nanocomposite structures can be formed, depending upon the solvent evaporation process, including layered mesophases, tubular mesophases, and a hierarchical composite coating composed of an isotropic worm-like micellar overlayer bonded to an oriented, nanolaminated underlayer.

26 Claims, 5 Drawing Sheets

