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(54) **NANOPARTICLE COMPOSITES AND NANOCAPSULES FOR GUEST ENCAPSULATION AND METHODS FOR SYNTHESIZING SAME**

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(58) **Field of Search** 523/201, 205, 523/210, 216, 217

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(57) **ABSTRACT**

Nanoparticle composites and nanocapsules for guest encapsulation and methods for synthesizing same. One synthesis method includes providing a nanoparticle template; and forming a shell on the nanoparticle template by polymerizing a monomer on the nanoparticle template to form a nanoparticle composite defined by the shell and the nanoparticle template. Another synthesis method includes providing a nanoparticle template; forming a shell on the nanoparticle template by polymerizing a monomer on the nanoparticle template; and dissolving the nanoparticle template to thereby form a hollow nanocapsule defined by the shell. Another synthesis method includes providing a nanoparticle template carrying a guest molecule; and forming a shell on the nanoparticle template by polymerizing a monomer on the nanoparticle template to thereby encapsulate the guest molecule. This method can also include dissolving the nanoparticle template to form a nanocapsule defined by the capsule shell material, wherein the guest material resides in the nanocapsule.

21 Claims, 15 Drawing Sheets