

عنوان مقاله:

Encapsulation of gold nanoparticles into lipid nanotubes

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خلاصه مقاله:

This paper aims to study the encapsulation behavior of gold nanoparticles inside lipid nanotubes (LNTs). To this end, the continuum approximation in the framework of the 6-12 Lennard-Jones (LJ) potential function is employed. The nanoparticle is modeled as a perfect dense sphere and the LNT is assumed to be comprised of six layers, namely two head groups, two intermediate layers and two tail groups. Analytical expressions are derived through undertaking surface and volume integrals to evaluate van der Waals (vdW) potential energy and interaction force of a gold nanoparticle entering a semi-infinite LNT. These expressions are then utilized to determine the suction and acceptance energies, two main characteristics of LNT-based systems for applications such as drug delivery and so on. The effect of nanoparticle radius on the suction and acceptance energies of system is investigated. Moreover, an acceptance condition is defined which examines whether the nanoparticle at rest can pass through the LNT or not. Based on the profiles of suction and acceptance energies, the values of suction, optimal and acceptance interwall spacing are obtained. Numerical results show that these parameters are slightly affected by nanoparticle radius and .head or tail group thickness

کلمات کلیدی:

Gold nanoparticles, Lipid nanotubes, Continuum approximation, Suction energy, Acceptance energy

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