Conjugated Polymer-Ag@SiO₂ Hybrid Fluorescent Nanoparticles for Application to Cellular Imaging

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A novel fluorescent core-shell nanoparticle based on water-soluble conjugated polymer and Ag@SiO₂ nanoparticle was prepared. The cationic conjugated polymer poly[9,9’-bis(6”-(N,N,N-trimethylammonium)-hexyl)fluorene-2,7-ylenevinylene-co-alt-1,4-phenylene dibromide] (PFV) was hybridized with Ag@SiO₂ nanoparticles via simple self-assembly procedure. Silver core was employed in the fabrication of fluorescent nanoparticles for its unique property referred to as metal-enhanced fluorescence which is highly dependent on the fluorophore-metal distance. Herein Ag@SiO₂ nanoparticles with different silica shell thicknesses were prepared to optimize the fluorescence enhancement. As expected, a 1.3-fold enhancement of the fluorescence intensity of PFV assembled on the Ag@SiO₂ was observed when the shell thickness was about 4 nm.

The suitable size of these nanoparticles allowed them to penetrate into cells rapidly. The nanocomposition exhibits good monodispersity and low cytotoxicity. Therefore, these properties make desirable materials for cellular imaging, and provide new opportunities to develop efficient materials for cellular labeling and sensing.