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Fluorescence and cytotoxicity of cadmium sulfide quantum dots stabilized on clay nanotubes

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Abstract

© 2018 by the authors. Licensee MDPI, Basel, Switzerland. Quantum dots (QD) are widely used for cellular labeling due to enhanced brightness, resistance to photobleaching, and multicolor light emissions. CdS and CdxZn1−xS nanoparticles with sizes of 6–8 nm were synthesized via a ligand assisted technique inside and outside of 50 nm diameter halloysite clay nanotubes (QD were immobilized on the tube's surface). The halloysite– QD composites were tested by labeling human skin fibroblasts and prostate cancer cells. In human cell cultures, halloysite–QD systems were internalized by living cells, and demonstrated intense and stable fluorescence combined with pronounced nanotube light scattering. The best signal stability was observed for QD that were synthesized externally on the amino-grafted halloysite. The best cell viability was observed for CdxZn1−xS QD immobilized onto the azine-grafted halloysite. The possibility to use QD clay nanotube core-shell nanoarchitectures for the intracellular labeling was demonstrated. A pronounced scattering and fluorescence by halloysite–QD systems allows for their promising usage as markers for biomedical applications.

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Keywords

Bioimaging, Halloysite, Intracellular labelling, Nanoarchitectures

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