

OFFICIAL ABSTRACT and CERTIFICATION

Attachment of CdSeTe/ZnS quantum dots to alginate biomaterial for non-invasive detection of gel implants

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Quantum dots (QDs), known for their size-dependent optoelectronic properties and fluorescence, have applications in in vivo imaging. Bioactive coatings, such as surfactants and polymers, limit cytotoxicity and allow for cell-specific targeting as well as alter the solubility, functionalization, quantum yield, and blinking properties of QDs. Due to high levels of endogenous absorbers, deep-tissue imaging requires excitation and emission wavelengths in the near infrared region (NIR), which mandate a wavenumber greater than 700 nm. CdSeTe/ZnS QDs with coatings and functional amines (-NH₂) were covalently linked with alginate biomaterial chains to form implantable alginate gels that can be non-invasively detected in vivo through infrared light. The amine functionalized CdSeTe/ZnS QDs, with the intent of developing a noninvasive imaging system, were confirmed to be stimulated and activated in the NIR. They were able to be covalently linked to alginate polymer chains and made into gel blocks. Future work will investigate the in vivo degradation of these QD-labeled alginate gels in animal models using a NIR fluorescence system for drug delivery.

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