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[Continued on next page]

(54) **Title**: UNIFORM CORE-SHELL TiO_2 COATED UPCONVERSION NANOPARTICLES AND USE THEREOF

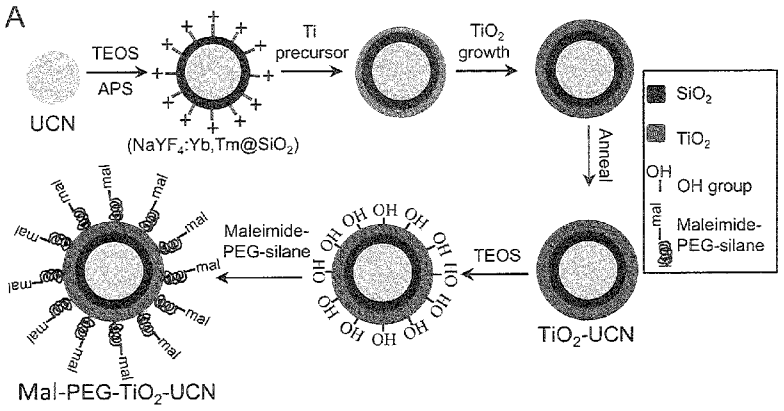


FIG. 11A

(57) **Abstract**: An upconversion nanoparticle (UCN) coated with a layer of semiconductor material is disclosed. The UCN core acts as a nanotransducer to convert near infrared (NIR) to visible and/or ultraviolet (UV) light while the semiconductor shell serves as a photocatalyst. Upon excitation by NIR light, the UCN upconverts NIR light to UV and/or visible light of different wavelengths. Spectral overlap between the emitted UV and absorption wavelength of the coated TiO_2 activates the TiO_2 layer to generate cytotoxic reactive oxygen species (ROS), which can be used in photodynamic therapy for the treatment of cancer cells. Stability and uptake of the nanoparticles can be increased by altering the coating of the nanoparticle, such as by a polymer and a dispersion stabilizer.

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