“Radio-Nanoparticle Quantum Dots for Multimodality Molecular Imaging”

VCU #11-059

Applications

- Biomedical imaging
- Radiochemotherapy
- Biologically targeted therapy
- Drug delivery & targeting
- Nanomedicine, nanotoxicology
- Cell imaging & therapy

Advantages

- Multimodality imaging (hybrid probes)
- *In vivo* and *ex vivo* analysis at microscopic Level
- High resolution quantitative autoradiography
- Multi-functional targeted imaging & therapy
- Greater stability & resistance to degradation pharmacokinetics

Inventors

Jamal Zweit, Ph.D., Dsc
Minghao Sun, Ph.D.
Sundaresan Gobalakrishnan, Ph.D.

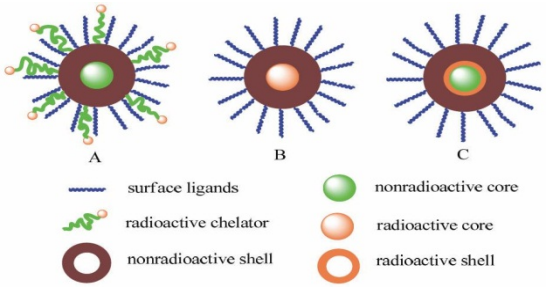
Contact

Magdalena K. Morgan, Ph.D.
Licensing Associate
mkmorgan@vcu.edu
Direct 804-827-6095

Market Need

Development of nano-imaging probes for *in vivo* platforms provides a unique opportunity to accelerate the clinical impact of molecular imaging and therapeutics. Nano-Molecular Imaging based on hybrid probes will yield quantitative and complementary information combining the individual strengths of optical, radionuclide and magnetic imaging from the same targeted probe. The unique elemental nature and physiochemical properties of quantum dots (QDs) combined with flexible and broad functionalization capabilities makes multi-modal quantum dots promising *in vivo* agents to study molecular aspects of disease and the workings of therapies. These features overcome the various limitations associated with organic dyes in terms of stability, robustness, flexibility of targeting, enhanced signal and imaging contrast and cost of manufacturing. Clinical translation is feasible because elemental hybrid quantum dots can be made from clinically relevant radionuclides currently used in clinical imaging and therapy.

Technology Summary



This is a novel approach to produce hybrid nanoparticlesfor multi-modality molecular imaging and potentially multi-modal therapeutics. The novel probes are produced using a simple and robust manufacturing process. It incorporates inorganic compounds that emit radionuclide, optical, magnetic signals in various bi- and tri-modal combinations. The product has a hybrid quantitative, high sensitivity and high resolution, with a high degree of specificity through multiple targeting. The applications could impact the future of nanomedicine in a wide range of different areas. These nanoparticles can be made from relatively non toxic elements, and can be imaged by clinical technologies such as SPECT, PET, MRI and MRS and in certain body locations by near infrared optical and photo-acoustic imaging.

Technology Status

U.S. patent pending: 13/586,079

See Paper (Sun et al., Am J Nucl Med Mol Imaging 2012;2(2):122-135)

This technology is available for licensing to industry for further development and commercialization.