OPTICAL SCIENCE & ENGINEERING
University of New Mexico

OSE SEMINAR SERIES

Dr. Todor Karaulanov,
Chief Instrumentation Scientist at Imagion Biosystems, Inc.

Early in vivo cancer detection by superparamagnetic relaxometry

February 21, 2017 at P&A, Rm. 190 from 11:00 AM – Noon

Abstract:
Clinically, the early cancer detection is directly linked to improved clinical outcomes and overall survival. Unfortunately, existing clinical methods for early detection lack sensitivity and/or specificity. The method of superparamagnetic relaxometry (SPMR) offers a rare opportunity in early diagnostics. The Imagion Biosystems' SPMR platform combines targeted delivery of superparamagnetic nanoparticles to tumor cells and their detection with very sensitive magnetic sensors - atomic magnetometers (AM) and/or superconductive quantum interference devices (SQUIDs). The advantage of SPMR over other methods for detection of magnetic particles (e.g., magnetic particle imaging) is in the differentiation of the particles bound to cancer cells versus those in circulation. Thus, only the tumor cells are made "visible". This unique quality is possible due to the clear distinction of the relaxation times of bound particles (Neel relaxation) and not bound particles (Brownian relaxation). *In vitro* and *in vivo* preclinical data will be presented. Clinical applications will be discussed too.

Biography:
Dr. Karaulanov holds the position of Chief Instrumentation Scientist at Imagion Biosystems Inc., an early cancer diagnostic company in Albuquerque, NM. Dr. Karaulanov has obtained his PhD in Physics in 2005 at the Bulgarian Academy of Sciences developing new types of atomic magnetometers based on coherent population trapping effect in alkali atoms. He has spent four years as a postdoctoral researcher at UC Berkeley in the group of Prof. Budker working on atomic polarization study at low temperatures and on improving the alkali metal vapor cell technology for use in atomic frequency standards and magnetometers. In 2010, Dr. Karaulanov has joined the group of Dr. Savukov at LANL to develop portable low-field MRI devices and demonstrated human brain MRI with an atomic magnetometer detection. Dr. Karaulanov joined Imagion Biosystems. Inc (at that time Senior Scientific., LLC) to work on early cancer detection in 2013.

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