J Material Sci Eng 2013, 2:4
http://dx.doi.org/10.4172/2169-0022.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery
2nd International Conference and Exhibition on
Materials Science & Engineering
October 07-09, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

The impact of ultrashort decoherence time on quantum coherence in hybrid quantum dot-metallic nanoparticle systems

Seyed Sadeghi
University of Alabama in Huntsville, USA

The possibility of maintaining of quantum coherence of semiconductor quantum dots is one of the most important desires in quantum optics, quantum devices, and particularly quantum computers. The existing attempts include using very low temperatures to suppress the large polarization dephasing rates of the quantum dots and/or using ultrashort optical pulses. In this contribution, we discuss the prospect of generation and preservation of quantum coherence effects in hybrid quantum dot-metallic nanoparticle systems at elevated temperatures. It will be shown, via theoretical means, that even when the decoherence times of the quantum dots are of the order of several hundreds of femtoseconds, as observed at room temperature, the molecular resonances of such hybrid systems formed via coherent exciton-plasmon coupling can remain quite distinct and observable. The quantum optical properties of the quantum dots in such hybrid systems, including the possibility of generation of ultra-narrow gain features, will be discussed.

Biography

Seyed Sadeghi received his Ph.D. in Physics from the University of British Columbia in Canada. He held NSERC postdoctoral fellowship before joining industry. In 2007, he joined University of Alabama in Huntsville. His fields of research include nanomaterials, quantum sensors based on hybrid nanoparticle systems, coherent optics of nanoparticles, and photophysics and photochemistry of colloidal quantum dots. Currently, he is serving as an editorial board member of Journal of Nanomedicine and Nanotechnology and Dataset Papers in Optics.

ss0013@uah.edu

Real time materials' nano-structure imaging using XRD reflection and transmission microscopy

T. S. Ananthanarayanan
Onsight Technology, USA

XRD microscopy for real time nano-structure characterization is a non-destructive, non-contact, non-intrusive, real time, high resolution method (spatially/real-space and in the diffraction/reciprocal-space) for imaging nano-structure of materials including polycrystalline, mono-crystalline, fibers, powders, amorphous, semi-crystalline, para-crystalline, and liquids & gasses. The methods are tried and tested for over a century now and have become practically feasible for on-line manufacturing applications. Data from a variety of materials will be presented to confirm the ability to image the "as solidified"/"as processed"/"as produced" signature nano-structure for each sample. We've studied materials used in a multitude of applications such as: micro-electronics, acousto-optics, super-conductors, super-lattice structures, LED materials, energetics, aerospace, etc. We will demonstrate the feasibility of recording and using nano-structural real time data for routine materials QC in the manufacturing environment to enhance rapid feedback process control. Such a tool in the production line would help identify the significant effects of processing on the materials' nano-structure and hence its performance and device yield. Current advanced processing methods like MBE and the related "clean room" environment amplifies the cost per processing hour per wafer substantially. The XRD microscope uses the simple principle of Bragg X-ray diffraction (XRD). It measures the deviation from ideal Bragg diffraction and correlates it to the nano-structure of the diffracting volume. This is an *in situ* method requiring no controlled environment and could be retrofitted to most existing and antiquated XRD equipment. Initial funding for this development was provided by organizations like DARPA, ONR, Army Night Vision Lab, SBIR, NASA, etc.

Biography

T. S. Ananthanarayanan (aka Ravi Ananth) has a master's degree in Mechanics and Materials Science from Rutgers University. He is presently the principal consultant at Onsight Technology, USA. He is also the Chief Environmental Technologies Consultant and CMO at NJ Medical Waste. He has been developing NDE materials characterization methods for nearly 3 decades.

raviananth25@yahoo.com