Nano-acoustics: materials, devices and applications

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Melcher Hall - Room 180 (Business School)

LECTURE ABSTRACT

Research involving acoustics-associated nanomaterials, nanostructures, nanofabrication and devices for a broad range of applications has been actively pursued over the past decade or so. In this talk, reviews are firstly given to the nanoacoustics topics including: interactions of acoustic waves with nano materials including nanoparticles, nano-bubbles, gas vesicles, nanodroplets; nano-materials and nanostructures for photoacoustics and laser ultrasound; acoustic sensors, actuators and transducers involving nanomaterials, and the associated applications in drug delivery, therapy, imaging, characterization, and manufacturing. Laser ultrasound transducers consisting of a layer of carbon nanomaterials and a layer of thermal elastic material are next reported as an example of nano-acoustic devices. Design, fabrication and characterization of laser ultrasound transducers are presented, followed by the demonstration of drug delivery and industrial non-destructive testing using these laser ultrasound transducers. Future trend of nano-acoustics research and nano-acoustics applications will also be discussed at the end of this talk.

SPEAKER BIOSKETCH

Dr. Xiaoning Jiang is a University Faculty Scholar and a Professor of Mechanical and Aerospace Engineering at North Carolina State University. He is also an Adjunct Professor of Biomedical Engineering at North Carolina State University and University of North Carolina, Chapel Hill. Dr. Jiang received his Ph.D. degree from Tsinghua University (1997) and his Postdoctoral training from the Pennsylvania State University (1997-2001). He was the Chief Scientist and Vice President for TRS Technologies, Inc. prior to joining NC State in 2009. Dr. Jiang is the author and co-author of two books, 5 book chapters, 9 issued US Patents, 94 peer reviewed journal papers and over 90 conference papers on piezoelectric ultrasound transducers, ultrasound for medical imaging and therapy, drug delivery, ultrasound NDT/NDE, smart materials and structures and M/NEMS. Dr. Jiang is a member of the technical program committee for a few international conferences including IEEE Ultrasonics Symposium (TPC-5), SPIE Smart Structures and NDE, ASME IMECE, IEEE NANO and IEEE NMDC. He also serves as the UFFC representative to IEEE Nanotechnology Council (NTC), NanoAcoustics Technical Committee Chair for IEEE NTC, IEEE NTC Distinguished Lecturer (2018), an editorial board member for the journal Sensors and a senior associate editor for the new ASME Journal of Engineering and Science in Medical Diagnostics and Therapy.

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