

UNH Materials Science Seminar

11:10-12:00, Thursday, November 15, 2007
Kingsbury Hall S145, University of New Hampshire

Optical Diffraction Based Displacement Sensing in MEMS and Metrology

Dr. Byungki Kim

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Optical diffraction based microelectromechanical systems (MEMS) have been successfully used in the field of display, spectroscopy and optical networks. Recently, the diffraction phenomenon has drawn more attention as a means to monitor displacement of microstructure with the integration of optoelectronics. A micromachined scanning grating interferometer (μ SGI) has been developed for use in measuring out-of-plane vibration of MEMS. The μ SGI uses a phase sensitive deformable diffraction grating to achieve interferometric axial resolution and a microfabricated lens to improve lateral resolution of the measurement. An assembled grating and lens chip are successfully integrated with a silicon photodiode in less than 2cm^3 . The integrated μ SGI has been demonstrated by measuring 4.4 nm, 900 kHz vibration of a diaphragm while actuating the deformable grating in the measurement. This seminar will focus on the optical diffraction based displacement sensing in MEMS and its application to AFM.

Dr. Byungki Kim is an assistant professor at the University of Massachusetts Lowell in the Nanomanufacturing Center of Excellence and NSF Center for High-Rate Nanomanufacturing. Before joining UMass Lowell, he was a National Research Council Postdoctoral Fellow in the Department of Physics at the Naval

Postgraduate School in California. He received his Ph.D. from the Georgia Institute of Technology, 2004; M.S. from Korea Advanced Institute of Science and Technology, 1993; and B.S. from Yonsei University in Korea, 1991; all in mechanical engineering. He also worked for Kia Motors from 1993 to 1999 as a research engineer. He developed the smallest interferometer called a “Micromachined Scanning Grating Interferometer” based on a novel optical design along with micromachining technology which resulted in three U.S. patents. His research interests include MEMS sensors and Nano/Micro metrology.

Host: Prof. Glen Miller