



Carbon-based Nano Electro-Mechanical Systems

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Abstract

Nano Electro-Mechanical Systems (NEMS) integrate critical structural electrical and mechanical elements at or below 100 nm. This is miniaturization of the Micro Electro-Mechanical Systems (MEMS), where the critical structural elements are on the micrometer length scale. Compared to MEMS, NEMS have smaller mass and higher surface area to volume ratio, which is advantageous for applications in manufacturing high frequency resonators and ultrasensitive sensors. Due to the promising potential applications of the emerging NEMS that is expected to have a major impact on our lives, research on NEMS reliability has been of crucial importance on the last decade. Aiming to provide an intuition and insight for researchers who are interested in reliability studies of NEMS, an extensive collection of researches were selected and integrated into this paper to cover the reliability issues of NEMS in different phases of their life cycles including design, manufacturing, logistics, and operation. The paper discusses failure causes on the nano-scales due mechanical, electrical, chemical, thermal factors, or combinations of them, which can occur during manufacturing and post-manufacturing phases. It also reviews common failure modes and mechanisms, the reliability aspects of design and manufacturing, as well as reliability evaluation and testing techniques for NEMS..

Nano electro-mechanical systems, design optimization of solar cooling systems for the climatic condition of Kuwait and improvement of solar charging in Kuwait using optimized maximum mower point tracking (MPPT) charge controller. In addition to her academic experience, Dr. Abeer has more than seven years of industrial experience. She also has been a consultant to the industry in areas of total quality management systems, operations management and control systems

Speaker Publications:

1. Control of Electro- Kinetic Microfluidic Biochemical Systems, A Al-Anazi, University of Hertfordshire, 2015
2. A combinatorial optimization algorithm for multiple cloud service composition, H Kurdi, A Al-Anazi, C Al Faries – Computers and Electrical Engineering 42, 107-113, 2015.
3. Gas-Liquid Multiphase Flows of High Speed Microfluidics, I Johnston, A Al-Anazi; Journal of Micromechanics and Micro-engineering 24 (3); 2014.

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Biography:

Dr. Abeer Al Anazi is an assistant professor of Mechanical Engineering at Australian College of Kuwait (ACK). She received her Ph.D. in Mechanical Engineering from the University of Hertfordshire – UK on 2015 for her work on the control of electro- kinetic microfluidic biochemical systems. Since then, she has been a principal and a co-principal investigator in a number of national and jointly international research projects on fluidics, micro-, nano- and bio-fluidic applications to process and device fabrication technologies, with emphasis on approaches taking steps towards modeling and `simulation - aided design methodology. Her past research include experimental heat transfer of Nano-fluids, carbon based