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Abeer Abdullah Al Anazi

The Australian University, Kuwait

Carbon-based nano electro-mechanical systems

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 research 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.

Biography

Abeer Abdullah Al Anazi is an assistant professor at the Australian University (AU) - Kuwait. She Received Dates her PhD in Mechanical Engineering from the University of Hertfordshire – UK for her work on the control of electro- kinetic microfluidic biochemical systems. Since then, she worked on many research projects on fluidics, micro, nano and bio-fluidic applications to process and device fabrication technologies, with emphasis on modelling and simulation - aided design methodologies. Her past research includes experimental heat transfer of Nano-fluids, carbon-based Nano electro-mechanical systems and design optimization. She has many publications and has been serving as an editorial board member of several reputed journals.

a.alanazi@au.edu.kw

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