NW-P005

Mechanical Properties of High Stressed Silicon Nitride Beam Measured by Quasi-static and Dynamic Techniques

Dong Hoon Shin[1], Hakseong Kim[1], Kirstie McAllister[1], Sangik Lee[1], Il-Suk Kang[2], Bae Ho Park[1], Eleanor E. B. Campbell[1,3], and Sang Wook Lee[1]

[1]Division of Quantum Phases & Devices, School of Physics, Konkuk University, Seoul 143-701, Republic of Korea, [2]National Nanofab Center, Korea Advanced Institute of Science and Technology, Daejeon 305-806, Republic of Korea, [3]EaStCHEM, School of Chemistry, Edinburgh University, David Brewster Road, Edinburgh EH9 3FJ, United Kingdom

Due to their high sensitivity, fast response, small energy consumption and ease of integration, nano-electromechanical systems (NEMS) have attracted much interest in various applications such as high speed memory devices, energy harvesting devices, frequency tunable RF receivers, and ultra sensitive mass sensors. Since the device performance of NEMS is closely related with the mechanical and flexural properties of the material in NEMS, analysis of the mechanical and flexural properties such as intrinsic tensile stress and Young's modulus is a crucial factor for designing the NEMS structures. In the present work, the intrinsic mechanical properties of highly stressed silicon nitride (SiN) beams are investigated as a function of the beam length using two different techniques: (i) dynamic flexural measurement using optical interferometry and (ii) quasi-static flexural measurement using atomic force microscopy. The reliability of the results is analysed by comparing the results from the two different measurement techniques. In addition, the mass density, Young's modulus and internal stress of the SiN beams are estimated by combining the techniques, and the prospect of SiN based NEMS for application in high sensitive mass sensors is discussed.

Keywords: Nano-electromechanical system, Silicon nitride, Mass sensor, Mechanical property, Resonator

NW-P006

Nanotransfer Printing for Large-Scale Integrated Nanopatterns of Various Single-Crystal Organic Materials

백장미, 박경선, 성명모

한양대학교 화학과

The manufacture of organic electronic circuits requires effective heterogeneous integration of different nanoscale organic materials with uniform morphology and crystallinity in a desired arrangement on a substrate. Herein, we present a new direct printing method, which enables monolithic integration of crystalline nanowire arrays with a diverse range of organic materials. In this method, we use a nanoscale patterned soft mold, which contains an assembly of simple nanoline patterns but, in combination with droplet of various organic inks, can produce a large-scale integration of various nanopatterns with multiple kinds of organic materials. The morphology of organic nanowires can controlled by nanoconfinement in nanoline of mold. And mutual alignment of nanopatterns can be controlled by adjusting the ink droplet size, number of droplets, ink deposition locations.

Keywords: nanopatterning, organic electronics, single crystal, printing