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Position-dependent deflection (PPD) of a nanobeam: a new method to determine the Young's modulus of nanoscale matter N. DUARTE, Dept. of Electrical Engr., The Pennsylvania State University, QIHUA XIONG, Dept. of Physics, The Pennsylvania State University, TADIGADAPA SRINIVAS, Dept. of Electrical Engr., The Pennsylvania State University, PETER EKLUND, Dept. of Physics, The Pennsylvania State University — In this approach, a nanowire beam is fixed at two ends and an AFM is used to apply a force F(x) where x locates the position along the beam and the beam deflection δz(x) is measured simultaneously. This situation is realized by placing a nanobeam over a trench fabricated on a Silicon substrate via photolithography followed by metal evaporation, lift-off and XeF_2 etching. The AFM tip force-distance curve is first obtained from experiments on the rigid substrate. The slope of the AFM force-distance obtained when the tip contacts the beam is then measured and the Young's modulus Y is obtained from the change in slope using the Euler-Bernoulli (E-B) equation. The beam dimensions are also required: the beam height and length via AFM and the beam width and length by SEM. We believe this method can be used in any other nano-beam systems to measure the Young's modulus. Results for rectangular ZnS beams ($\sim$100nm x 100 nm x 5μm long) will be presented that demonstrate the potential for this method. Values for Y lower than reported for the bulk are obtained (i.e. Y(nano) $\sim$ 70% Y(bulk)). This work was supported, in part, by NSF-NIRT DMR-0304178

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