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**Probing Mechanical Resonances in Cantilevered Coiled Carbon Nanowires** DEEPIKA SAINI, DOYL DICKEL, HERBERT BEHLOW, BALU PILLAI, KEQIN YANG, MALCOLM SKOVE, Clemson University, STEVEN SERKIZ, Savannah River National Laboratory, APPARAO RAO, Clemson University, CLEMSON UNIVERSITY TEAM, SAVANNAH RIVER NATIONAL LABORATORY TEAM — Helically coiled carbon nanowires (CCNW) and nanotubes are promising elements for use in MEMS/NEMS devices and nanorobotics, as nanoinductors and sensors, and for impact protection (e.g. Bell *et al.* 2007 IEEE International Conference, J. Appl. Phys. **100**, 064309 (2006)). Understanding and characterizing their mechanical resonance behavior is essential for the reliability in applications. In this study, we have electrically actuated an individual CCNW in a diving-board cantilever configuration inside a scanning electron microscope, and electrically detected its mechanical resonance modes. By oscillation at low frequency we confirmed the induced-charge actuation mechanism. Among the modes we observed, some appeared to have both axial and lateral components. We also observed closely spaced resonance modes which we attribute to the splitting of degenerate modes, consistent with our COMSOL simulations. We suggest that the helical morphology facilitates inter-mode coupling that results in the observed complex resonance behavior.

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