Abstract Submitted
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Investigating the Structure and Mechanical Properties of Graphene via Nanoindentation and Atomic Force Microscopy ALEM TEKLU, CANYON BARRY, MATTHEW PALUMBO, COLLIN WEIWADEL, NARAYANAN KUTHIRUMMAL, College of Charleston — Graphene oxide was converted to multi-layer graphene via Lightscribe DVD burner reduction. Images of the samples were captured using the Nanosurf Flex AFM. Spectroscopic analysis via nanoindentation was performed on the samples after each oxygen reduction cycle, thus allowing for a comparison of stiffness, hardness, and the reduced Young's modulus based on the number of reduction cycles. The highest values obtained were after the fifth and final reduction cycle, yielding a stiffness of 109.64 2.59 N/m, a hardness of 607.82 10.33 GPa, and a reduced Young's modulus of 9.14 0.21 GPa. This data was then compared to the values measured with a commercially purchased chemical - vapor deposited (CVD) graphene. The stiffness, hardness, and reduced Young's modulus for the commercial sample were 141.57 2.14 N/m, 637.38 6.09 GPa, and 11.80 0.18 GPa, respectively. Parallel plate square capacitors (2.5 cm 2.5 cm) were also built using these laser-scribed graphene samples.

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