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Effects of Gasses on the Thermal Etching Properties of Graphene Nanoribbons JASON JONES, PHILLIP ECTON, YUDONG MO, BRIAN GORMAN, DAVID DIERCKS, THOMAS SCHARF, JOSE PEREZ, DEPARTMENT OF PHYSICS, UNIVERSITY OF NORTH TEXAS COLLABORATION, DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, UNIVERSITY OF NORTH TEXAS COLLABORATION — We investigate the rates of thermal etching for different thicknesses of graphene nanoribbons exposed to different gasses. Etching rates are determined by comparing the change in width of the ribbons to etching time. The thickness and width of the graphene nanoribbons are precisely measured using Atomic Fore Microscopy (AFM). We synthesize sheets of graphene by exfoliating Highly Ordered Pyrolytic Graphite (HOPG) onto a silicon substrate. Optical identification of the scattered graphene sheets is optimized by using a silicon substrate shielded with a 300nm thermal oxide layer, giving the substrate a deep blue color. Verification of monoatomic graphene is accomplished by Raman imaging. Graphene sheets are cut into ribbons using a Focused Ion Beam (FIB). Using FIB techniques, ribbons on the order of 50 to 100 nanometers are produced. The nanoribbons are placed in a furnace combined with a rough vacuum. The graphene nanoribbons are etched by exposure to oxygen gas at a pressure of 300 millitorr for 15 minutes at 650 degrees Celsius. We studied the effects of different gasses on the etching properties of the nanoribbons.

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