

Abstract Submitted
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Reduction Kinetics of Graphene Oxide Determined by Temperature Programmed Desorption CARL VENTRICE, NICHOLAS CLARK, DANIEL FIELD, HEIKE GEISLER, Dept. of Physics, Texas State University, IN-HWA JUNG, DONGXING YANG, RICHARD PINER, RODNEY RUOFF, Dept. of Mechanical Engineering, University of Texas — Graphene oxide, which is an electrical insulator, shows promise for use in several technological applications such as dielectric layers in nanoscale electronic devices or as the active region of chemical sensors. In principle, graphene oxide films could also be used as a precursor for the formation of large-scale graphene films by either thermal or chemical reduction of the graphene oxide. In order to determine the thermal stability and reduction kinetics of graphene oxide, temperature program desorption (TPD) measurements have been performed on multilayer films of graphene oxide deposited on SiO₂/Si(100) substrates. The graphene oxide was exfoliated from the graphite oxide source material by slow-stirring in aqueous solution, which produces single-layer platelets with an average lateral size of $\sim 10 \mu\text{m}$. From the TPD measurements, it was determined that the decomposition process begins at $\sim 80 \text{ }^\circ\text{C}$. The primary desorption products of the graphene oxide films for temperatures up to $300 \text{ }^\circ\text{C}$ are H₂O, CO₂, and CO, with only trace amounts of O₂ being detected. An activation energy of 1.4 eV/molecule was determined by assuming an Arrhenius dependence for the decomposition process.

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