

NRI SUPPLEMENT — DIRECT-WRITE SYNTHESIS OF GRAPHENE DEVICES

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Student participants: Yana Cheng, Maria Stournara

The supplement was awarded in 2009 and two graduate student RAs have been hired: Yana Cheng is working with Professors Beresford and Zia on the experimental effort, and Maria Stournara is working with Professor Shenoy on multiscale modeling. The experimental effort thus far has focused on configuring the epitaxy and laser processing facilities for the intended work. Initial experiments have been performed to demonstrate SiC growth on Si and to characterize SiC, graphite, and other materials using Raman spectroscopy. Simulations have been performed to investigate the band gaps in graphene nanoribbons when both oxygen double-bonds and hydrogen/hydroxyl single bonds are present, and a manuscript describing based on this work is being prepared for submission. The NRI Liaison Team visited on Jan. 15, 2010, and helped focus the investigations for the coming period by emphasizing three priority areas: (1) achieving the highest possible quality SiC epitaxy on AlN, whether the AlN is itself epitaxial or bulk; (2) understanding what thickness of SiC is required relative to both thermal management and mode coupling; and (3) using the modeling effort to support the understanding of the epitaxial process, including transient development during annealing.