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Plasma enhanced atomic layer deposition of ultrathin oxides on graphene[1] CHRISTIE J. TRIMBLE, ANNA M. ZANIEWSKI, MANPUNEET KAUR, TREVOR VAN ENGELHOVEN, ROBERT J. NEMANICH, Arizona State University — Graphene, a single atomic layer of sp2 bonded carbon atoms, possesses extreme material properties that give rise to a variety of potential electronic applications. Many of these possibilities require the combination of graphene with dielectric materials such as metal oxides. While many dielectric deposition techniques exist, plasma enhanced atomic layer deposition (PEALD) has been shown to produce ultrathin dielectric films with superior densities and interfaces. However, exposure to oxygen plasma can cause graphene to deteriorate, and therefore the degree to which PEALD on graphene can be achieved without significant damage to the graphene layer is not well understood. In this project, we perform PEALD of aluminum oxide on graphene, investigating a range of plasma conditions across a single sample. We characterize both oxide growth and graphene deterioration post deposition using spectroscopic analysis and atomic force microscopy. By our method we achieve ultrathin (<1 nm) aluminum oxide films atop graphene.

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