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Atomically-Smooth MgO films grown on Epitaxial Graphene by Pulsed Laser Deposition[1] SEAN STUART, ANDREAS SANDIN, JACK ROWE, DAN DOUGHERTY, North Carolina State University, MARC ULRICH, Army Research Office — The growth of high quality insulating films on graphene is a crucial materials science task for graphene electronic and spintronic applications. It has been demonstrated that direct spin injection from a magnetic electrode to graphene is possible using MgO tunnel barriers of sufficient quality. We have used pulsed laser deposition (PLD) to grow thin magnesium oxide films directly on epitaxial graphene on SiC(0001). We observe very smooth film morphologies (typical rms roughness of $\sim$ 0.4 nm) that are nearly independent of film thickness and conform to the substrate surface which had $\sim$ 0.2 nm rms roughness. Surface roughness of 0.04 nm have been recorded for $\sim$ 1nm films with no pinholes seen by AFM. XPS and XRD data show non crystalline, hydroxylated MgO films with uniform coverage. This work shows that PLD is a good technique to produce graphene-oxide interfaces without pre-deposition of an adhesion layer or graphene functionalization. The details and kinetics of the deposition process will be described with comparisons being made to other dielectric-on-graphene deposition approaches.

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Sean Stuart
North Carolina State University

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