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Electron Stimulated Decomposition of Acetylene as a Precursor for Graphene MAHESH KUMAR, National Physical Laboratory, New Delhi, SARA ROTHWELL, PHILIP COHEN, University of Minnesota — We report here on the deposition of carbon via C_2H_2 dissociation by electron beam irradiation and thermal decomposition. The substrates investigated include sapphire, silicon, ALD deposited Al_2O_3/SiO_2, and GaN/sapphire. Raman analyses show that on C-plane sapphire both thermal decomposition and electron beam stimulated dissociation of C_2H_2 deposit carbon successfully. On other substrates these methods were inactive, showing the decomposition of C_2H_2 on sapphire is catalytic. We tested different annealing times and C_2H_2 pressures, gauging absorption saturation with RHEED. Samples exposed to 15 min. C_2H_2 adsorption during 400 eV electron irradiation and then annealed for 2 hr. to above 600°C in high vacuum showed the greatest proportion of sp2 to sp3 bonding by Raman analysis. The Raman spectra also suggest hydrogen adsorption, which may hinder further sp2 bonding. Annealing samples in a hydrogen atmosphere does not change their Raman spectra, suggesting hydrogen saturation. Partial support from the University of Minnesota Institute for Renewable Energy and the Environment

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