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Correlation of optical and topographical measurements with electronic transport properties of epitaxial graphene on Si-face SiC PAUL M. CAMPBELL, Naval Research Laboratory, Washington DC, JOSHUA ROBINSON, Pennsylvania State University, University Park PA, JAMES C. CULBERTSON, JOSEPH L. TEDESCO[1], GLENN G. JERNIGAN, RACHEL L. MYERS-WARD[2], CHARLES R. EDDY, JR., D. KURT GASKILL, Naval Research Laboratory, Washington DC — Epitaxial graphene layers grown on the Si face of (0001) SiC substrates by thermal desorption of Si were studied by Raman spectroscopy. Characteristic D, G, and 2D peaks were observed, and the 2D peak was used to extract layer thickness and film strain. These results, along with measured Hall mobility and topography from AFM, were used to establish those factors that influence the transport properties of graphene devices. The combination of uniform strain and nearly uniform thickness usually results in high-mobility graphene with an average room temperature Hall mobility >1000 cm^2/Vs. In contrast, films with nonuniform strain and thickness typically show lower values of mobility. These results will be useful for optimizing growth conditions to produce uniformly high-mobility graphene on full 2-inch and 3-inch SiC wafers, an agenda that we are now pursuing.

[1]ASEE Postdoctoral Fellow
[2]ASEE Postdoctoral Fellow

Paul M. Campbell
Naval Reaearch Laboratory, Washington DC

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