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Abstract for an Invited Paper
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Electronic coherence and confinement in patterned epitaxial graphene

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I will present very recent results from our studies of ultrathin graphite films that are epitaxially grown on single crystal silicon carbide. The quasi-two dimensional films consisting of a few to a few dozen graphene layers are patterned ($\geq 0.1\mu$m) using standard e-beam lithography methods. Relatively high mobilities (μ up to 10,000 cm^2/Vs) are deduced from transport measurements. Patterned structures reveal a variety of mesoscopic effects (i.e. universal conductance fluctuations and anomalous Shubnikov de Haas oscillations) from which coherence lengths of the order, or greater than 1μm at cryogenic temperatures are deduced. Evidence for size dependent resistivities even at room temperature is observed. Changes the magnetoresistive properties at about 2K provide evidence for an unusual, first order phase transition. The properties of this new patternable quasi-2D material are promising for sub-micron electronics applications.