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Near-field microscopy of transferred graphene-graphene heterostructures: Interplay between materials properties and preparation procedure MICHAEL BLADES, HAOMIN WANG, TETYANA IGNATOVA, Lehigh University, RAMYA VISHNUBHOTLA, A.T. CHARLIE JOHNSON, University of PA, XIAOJI G. XU, SLAVA V. ROTKIN, Lehigh University — Micro-Raman and scattering-type Scanning Near-field Optical Microscopy (s-SNOM) are well established graphene characterization methods that can go beyond imaging mode: thorough analysis of the signals obtained can provide direct mapping of materials properties of graphene. While pristine graphene has been already studied intensively, heterostructures, including those combining infinite 2D-layers with confined 1D- or 0D-objects (wires or dots), received less attention so far. Starting with the high quality CVD graphene (on Cu) we mastered transfer techniques that produce monolayers with a series of islands of a second layer, making natural bilayer heterostructures of different type. Both properties determined by the symmetry of graphene-graphene heterostructures (such as size quantization, edge symmetry, rotational commensurability) and by the transfer procedure and the substrate (like doping level, strain, warping and wrinkling) can reflect on the optical response. Mid-infrared s-SNOM interferometric microscopy has revealed sensitivity of the signal to lattice matching. This was correlated to the large scale micro-Raman mapping followed by statistical principal component analysis to obtain relation between intrinsic materials properties and those from the preparation methods.

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