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Determination of the Crystallographic Orientation of Graphene by Raman Spectroscopy MINGYUAN HUANG, Department of Mechanical Engineering, Columbia University, HUGEN YAN, Department of Physics and Electrical Engineering, Columbia University, CHANGYAO CHEN, Department of Mechanical Engineering, Columbia University, DAOHUA SONG, TONY HEINZ, Department of Physics and Electrical Engineering, Columbia University, JAMES HONE, Department of Mechanical Engineering, Columbia University — We present a systematic study of the Raman spectra of the G band in graphene monolayers under tunable uniaxial tensile stress. The G band splits into two distinct sub-bands (G^+, G^-) because of the strain-induced symmetry breaking. Raman scattering from the G^+ and G^- bands shows a distinctive polarization dependence that reflects the angle between the axis of the stress and the underlying graphene crystal axes. Polarized Raman spectroscopy therefore constitutes a purely optical method for the determination of the crystallographic orientation of graphene.

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