

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Determining the elastic constants of rubrene single-crystals¹

MARCOS REYES-MARTINEZ, Polymer Science & Engineering. University of Massachusetts Amherst, ASHWIN RAMASUBRAMANIAM, Mechanical & Industrial Engineering. University of Massachusetts Amherst, ALEJANDRO BRISENO, ALFRED CROSBY, Polymer Science & Engineering. University of Massachusetts Amherst — Organic single crystals have opened the doors to a new generation of high-performance organic electronic devices. Exceptional charge-transport properties combined with the advent of large-area patterning techniques make organic single crystals excellent candidates for flexible electronics applications. However, in order to effectively employ organic single crystals on mechanically flexible architectures, their mechanical properties need to be understood and characterized. In this presentation, the mechanical properties of rubrene single-crystals are investigated. Given the limited dimensions of as-grown crystals and associated handling difficulty, the elastic buckling instability is chosen as a metrology tool for determining the in-plane elastic constants. Our results show that ultrathin (200nm - 1000nm) rubrene crystals exhibit anisotropic wrinkling wavelengths as a function of crystallographic direction, which can be correlated to the anisotropic nature of its molecular packing. An adaptive intermolecular reactive bond order potential (AIREBO) is employed to calculate the nine elastic constants corresponding to orthorhombic rubrene.

¹US Department of Energy, Office of Basic Energy Sciences as part of Polymer-Based Materials for Harvesting Solar Energy, an Energy Frontier Research Center (EFRC)

Marcos Reyes-Martinez
University of Massachusetts Amherst

Date submitted: 19 Nov 2011

Electronic form version 1.4