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Layer Transferred Graphene for Solar Cell Applications RONALD MYERS, ZHIBING WANG, YING LIU, JOSHUA ROBINSON, AARON TODD, JIAN XU, Pennsylvania State University — Indium tin oxide (ITO) used commonly as a transparent electrode has proven to be unfavorable for the eventual commercialization of organic photovoltaic devices. We have investigated graphene grown on copper by CVD and transferred to arbitrary substrates as a possible replacement for ITO. Graphene-covered copper foils (Alfa Aesar) were first coated in photoresist (Shipley 1805) and the copper was removed with a ferric chloride based etchant. After cleaning in water the photoresist and graphene was transferred to the substrate of choice and the photoresist was removed with acetone. The transferred graphene were found to show a Hall mobility higher than 2000 cm^2/Vs at room temperatures and optical absorbance of 3.2% at 550nm and 2.5% at 900nm. We used scanning Raman spectroscopy to characterize the thickness of the graphene and found that 90+% of layer transferred material is single layer graphene. The remainder was found to consist of clusters of bi- or multi-layer graphene of a typical size ranging from 0.5 to 2 μm. We fabricated organic hybrid solar cells utilizing this material as a transparent electrode. Results including a comparison between graphene and ITO devices fabricated using the same procedure and efforts to improve the efficiency of such graphene hybrid solar cells will be presented. Work supported in part by NSF.

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