Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Gas Barrier and Separation Behavior of Graphene Oxide Nanobrick Wall Thin Films JAIME GRUNLAN, Texas A&M University — In many cases, electronics packaging requires electrical conductivity and barrier to oxygen, even under humid conditions. These two properties have simultaneously been realized through the use of surfactant-free aqueous layer-by-layer (LbL) processing, in the form of a polymer composite nanocoating. By layering graphene oxide (GO) with polyethyleneimine (PEI), a "nano brick wall" structure has been created, imparting gas barrier properties to the film. Reducing the graphene oxide with a thermal treatment further produces high oxygen barrier in humid conditions and imparts high electrical conductivity ($\sigma \sim 1750$ S/m). These thin films (<400 nm) are flexible relative traditional conductive thin films (e.g. ITO), and processing occurs under ambient conditions with water as the only solvent. Additionally, these PEI/GO thin films exhibit H2/CO2 selectivity (>300), making them interesting for gas purification membranes. The flexible nature of the aforementioned thin films, along with their excellent combination of transport properties, make them ideal candidates for use in a broad range of electronics and other packaging applications.

Jaime Grunlan
Texas A&M University

Date submitted: 12 Nov 2014 Electronic form version 1.4