

## Graphene oxide-montmorillonite nanocomposite films with exceptional barrier properties from scalable, one-step coassembly

Anna M. LaChance<sup>1</sup>, Luyi Sun<sup>2</sup>

1. Chemical & Biomolecular Engineering, University of Connecticut, Willimantic, CT, United States.
2. Insitiute of Material Science, University of CT, Storrs, CT, United States.

Often used in packaging material, polylactic acid (PLA) has only moderate water vapor transmission rate (WVTR) and high oxygen transmission rate (OTR), thus limiting its applicability. In a facile, scalable dip coating process, a coating layer consisting of graphene oxide (GO) and montmorillonite (MMT) nanosheets were co-assembled with a polyvinyl alcohol (PVA) matrix was applied to PLA film. The resulting coating layer had vastly improved water vapor and oxygen barrier properties over the previous literature, owing to the combination of nanosheets of differing mechanical properties and aspect ratio to create a tortuous path for gas transport. The interfacial chemistry of the coating materials was verified with XRD, XPS, FTIR, and Raman spectroscopy. This technique should have unique implications for thin film vapor barrier technology, such as food packaging material, wearable electronics, biomedical devices, construction material, and anti-corrosives.

