

# Structural integrity of polyelectrolyte/graphene oxide layer-by-layer assemblies in concentrated aqueous solutions

**Tamás Szabó<sup>\*</sup>, Nizar Alsharif, Kevin Stefan Herman**

Department of Physical Chemistry and Materials Science, University of Szeged, Hungary

<sup>\*</sup>E-mail: sztamas@chem.u-szeged.hu

Layer-by-layer assemblages of graphene oxide (GO) and various colloidal particles or polymers are an important class of graphene-based solids for various proposed applications. However, the post-deposition stability of these ultrathin films has been scarcely studied. Here, we demonstrate that a simple UV-visible spectrophotometric method can be efficiently employed to characterize the structural and chemical stability and adsorption properties of hybrid polyelectrolyte/graphene oxide films in various aqueous solutions [1]. The immersion stability of GO layer-by-layer (LbL) self-assembled with a polycation into ultrathin multilayered films was studied in water and in concentrated salty, acidic and basic solutions. Surprisingly, these films were found to retain both their chemical stability and physical integrity not only in water, but also at high concentrations of NaCl and HCl with a slight rearrangement of the nanoscale structure as shown by the change in their visible spectrum. However, immersion into NaOH solutions above molar concentration led to the decomposition of the multilayer structure by base-induced deoxygenation of GO. The adsorption of methylene blue on polymer/GO LbL films of various thicknesses revealed that the multilayers are largely impermeable towards this cationic dye.

## **Acknowledgments**

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## **References**

[1] T Szabó, Z Péter, E Illés, L Janovák, A Talyzin, Stability and dye inclusion of graphene oxide/polyelectrolyte layer-by-layer self-assembled films in saline, acidic and basic aqueous solutions. Carbon 111:350 (2017)