Developing Multiplexed Graphene Sensors through Laser Induction for ALS Disease

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Amyotrophic Lateral Sclerosis (ALS) is a fatal neuromuscular disease that causes death within five years of onset of symptoms. Diagnosis for ALS relies on a detailed history of the symptoms and a series of muscle and imaging tests to rule out other diseases. The availability of a range of sensitive tools to diagnose the disease presents a challenge in a resource-limited region.

Recent progress in the identification of ALS-associated biomarkers in biological fluids provides an opportunity to develop sensitive and inexpensive electroanalytical diagnostic protocols. In this project, we embark on the simple and inexpensive fabrication of a sensitive graphene-based sensor using a CO_2 laser that converts plastic materials into multi-layered graphene. These laser-induced graphene layers can be integrated into miniaturized sensor platforms, such as screen-printed electrodes and microfluidic chips, to detect a wide range of analytes in different biological samples, including blood, urine, sweat, and saliva. Specifically, we want to develop a multiplexed sensing chip for the parallel detection of multiple biomarkers in a single assay, which will eventually make the detection immensely efficient and affordable for the patient.