Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **510** Type: **Oral (Non-Student) / Orale (non-étudiant(e))**

Functionalized surfaces of graphene field effect transistors for gas sensing

Monday, 7 June 2021 15:50 (5 minutes)

Graphene is among the most promising materials considered for next-generation gas sensing due to its properties including high mechanical strength and flexibility, high surface-to-volume ratio, large conductivity, and low electrical noise. While gas sensors based on graphene devices have already demonstrated high sensitivity, one of the most important figures of merit, selectivity, remains a challenge. In the last few years, however, surface functionalization emerged as a potential route to achieve selectivity. In this talk, we focus on experiments where we functionalized the surface of CVD graphene field-effect transistors (GFET) through thermal evaporation of metal-free phthalocyanines and copper phthalocyanines. We present and discuss sensitivity and selectivity results obtained when such sensors are exposed to volatile organic compounds such as ethanol, toluene, formaldehyde, and acetone. In general, the functionalized GFET presented enhanced selectivity for oxygen-containing molecules (formaldehyde and acetone).

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Session Classification: M3-8 Applied Physics (DAPI) / Physique appliquée (DPAI)

Track Classification: Applied Physics and Instrumentation / Physique appliquée et de l'instrumentation (DAPI / DPAI)