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Surface aging phenomena in multidimensional sp^2 carbon allotropes YUN-HSIANG CHANG, SERGIO SANTOS, MATTEO CHIESA, Laboratory for Energy and NanoScience, Masdar Institute — Despite the current interest in the scientific community in exploiting divergent surface properties of graphitic carbon allotropes, conclusive differentiation remains elusive even when dealing with parameters as fundamental as adhesion. Here we set out to provide conclusive experimental evidence on the time evolution of the surface properties of highly oriented pyrolytic graphite (HOPG), graphene monolayer (GML) and multiwalled carbon nanotubes (MWCNTs) as we expose these materials to airborne contaminants, by providing 1) statistically significant results based on large data-sets, i.e. thousands of force measurements, and 2) errors sufficiently self-consistent to treat the comparison between data-sets in atomic force microscopy measurements. We first consider HOPG as a model system and then employ our results to draw conclusions from the GML and MWCNT samples. We find that, in terms of surface properties and thus regarding surface functionality, aged HOPG and GML are more similar than aged HOPG and cleaved HOPG. The state of the HOPG samples is also as relevant for the comparison between HOPG and MWCNTs.

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