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VACUUM-FREE AND HYDROGEN-FREE GRAPHENE SYNTHESIS

P Häberle¹, C Orellana¹, T Cunha², C Fantini² and A Jaques¹

¹Universidad Técnica Federico Santa María, Chile ²Universidade Federal de Minas Gerais (UFMG), Brazil

A modified method to grow graphene in a single-step process is proposed. It is based on chemical vapour deposition (CVD) and considers the use of methane as carbon source. Synthesis takes place in an open chamber without requiring the addition of gaseous hydrogen in any of the synthesis stages. The synthesis occurs between two parallel Cu plates, heated up via electromagnetic induction. The inductive heating yields a strong thermal gradient between the catalytic substrates and the surrounding environment, promoting the enrichment of hydrogen, generated as methane fragments, within the volume confined by the Cu foils. This induced density gradient is due to thermo diffusion, also known as the Soret effect. Hydrogen and other low mass molecular fractions produced during the synthesis process inhibit the oxidative effects and simultaneously reduce the native oxide on the Cu surface. As a result, high quality graphene is obtained, only on the inner surfaces of the Cu sheets, as confirmed by Raman Spectroscopy.

Patricio.haberle@usm.cl

