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# Controlled Synthesis of Graphite Oxide: Formation Process, Oxidation Kinetics, and Optimized Conditions

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## Abstract

Graphite oxide (GO) is one of the most extensively studied materials and has been tested for numerous applications due to its unique properties. Nevertheless, a quantitative description of complicated transfer and reaction rates of the oxidation of graphite is still not available, which essentially hinders large-scale production of high-quality GO and other graphene related materials. In this work, GO is prepared from flake graphite (FG) by a modified Hummers method. Size and color evolutions of time-dependent complementary domains, i.e. the starting GO domain and the remaining FG domain, are monitored during the entire oxidation process. The oxidation of FG in acidic oxidizing medium can be interpreted as a contracting area process controlled by phase boundary. Reaction rate constant ( $k$ ) and kinetic parameters ( $E_a$ ,  $\ln A$ ) are obtained after a systematic

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