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Fundamental growth mechanisms of graphene on nickel surfaces¹

MATTHIAS BATZILL, University of South Florida

CVD growth of graphene over transition metal surfaces has become a main approach for synthesizing large area graphene wafers. The low carbon solubility in copper makes a good material for monolayer graphene synthesis, while carbon dissolution and re-segregation from the bulk of other transition metals, namely nickel, make these materials more demanding for controlling graphene growth. However, lower growth temperatures and defined graphene orientation relative to the substrate are some benefits for graphene synthesis on nickel compared to copper. Here we thoroughly characterize the fundamental growth processes of graphene on nickel substrate with the aim to find growth procedures that enable controlled graphene synthesis. We also identify defect structures in graphene that are formed as a consequence of the nickel substrate.

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