

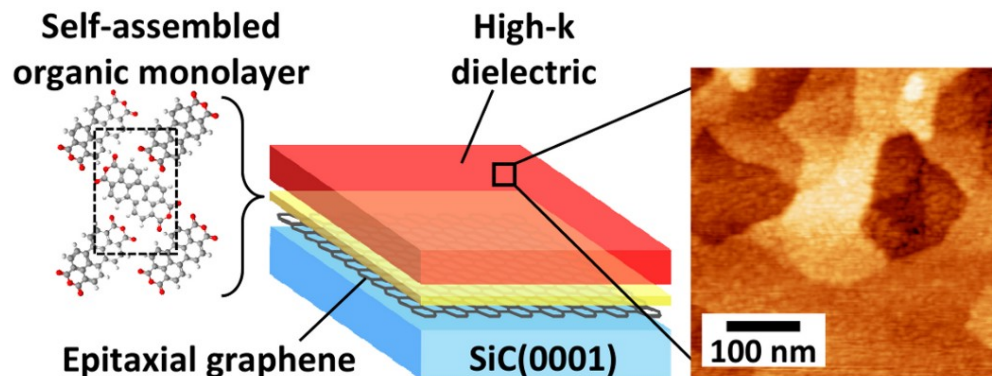


Seeding Conformal Dielectrics on Graphene



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The development of graphene-based nanoelectronics requires the deposition of ultrathin and pinhole-free high- k dielectric films at the wafer scale. In this work, we demonstrate that self-assembled monolayers (SAMs) of perylene-3,4,9,10-tetracarboxylic dianhydride (PTCDA) act as effective organic seeding layers for atomic layer deposition (ALD) of HfO_2 and Al_2O_3 on graphene. Whereas identical ALD conditions lead to incomplete dielectric deposition on bare graphene, the PTCDA seeding layer yields highly uniform and conformal films. Capacitors based on PTCDA-seeded dielectrics show high capacitance values ($\sim 700 \text{ nF/cm}^2$) and low leakage currents ($< 10^{-8} \text{ A/cm}^2$). These results demonstrate the viability of sublimated organic SAMs as seeding layers for high- k dielectric films in graphene-based nanoelectronics..



Atomic layer deposition growth of conformal, pinhole-free high- k dielectric films are seeded on epitaxial graphene on SiC(0001) via vacuum deposited PTCDA self-assembled monolayers.