Graphene-BN Heterostructures: An In-Plane Transistor

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Moore’s Law: In-Plane Approach
Moore’s Law: Vertical Approach
Graphene

Atomic and Electronic Structure

Material Properties

Excellent electronic properties

High structural stability

20 μm

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Boron Nitride

Atomic Structure

Material Properties
Large bandgap dielectric [insulator]
Structurally and chemically compatible to Graphene
Graphene-BN Heterostructure
Atmospheric Pressure Chemical Vapor Deposition
Interface Structure
Growth Mechanism

“Continuous Growth of Hexagonal Graphene and Boron Nitride In-Plane Heterostructures by Atmospheric Pressure Chemical Vapor Deposition”, Gang Hee Han et. al, ACS NANO (2013)
The Third Ring

Importance
Conducting Channel

Hydrogen Etching
BN etches away at high temperatures

Low Temperature
Graphene Growth
Change the carbon source in order to limit the breakdown of the BN ribbon
The Result

Benzoic Acid ($C_7H_6O_2$)

Best Result to Date

Grown at 875°C

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