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Construction of graphene/silicene heterostructure by Si intercalation

Silicene-based van der Waals heterostructures have been theoretically predicted to have interesting physical properties, but their experimental fabrication has remained a challenge because of the easy oxidation of silicene in air. Here we report the fabrication of graphene/silicene van der Waals heterostructures by silicon intercalation. Density-functional-theory calculations show weak interactions between graphene and silicene layers, confirming the formation of van der Waals heterostructures. The heterostructures show no observable damage after air exposure for extended periods, indicating good air stability. The I-V characteristics of the vertical graphene/silicene/Ru heterostructures show rectification behavior.

References

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Figures

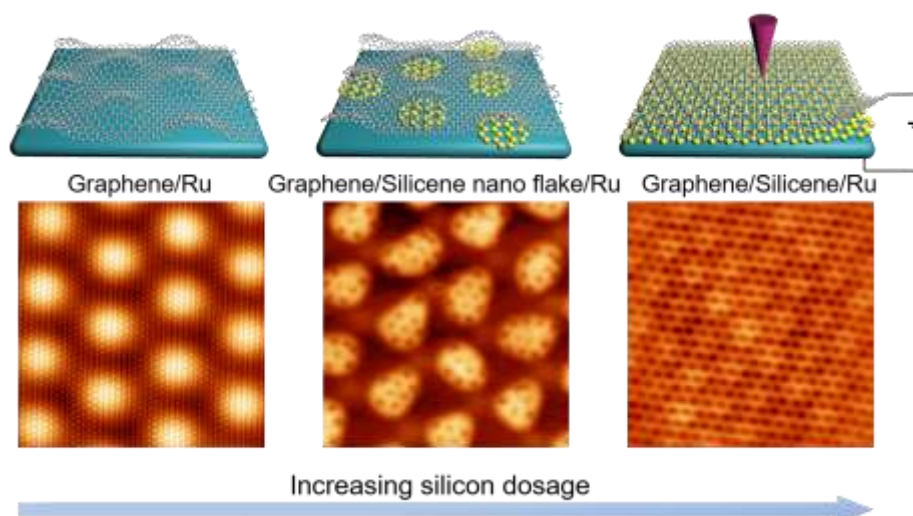


Figure 1: Formation of graphene/silicene heterostructure.

