GRIFONE: Graphitic films of group III nitrides and group II oxides: platform for fundamental studies and applications

Main area: New layered materials and heterostructures
Keywords: hexagonal AlN; hexagonal ZnO; graphene; MOCVD; Nanoscale resolution electrical characterization techniques; TEM; ab-initio modeling
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Abstract

This project aims at a breakthrough in the fabrication of graphene heterostructures with semiconducting materials by developing an innovative material concept for graphitic films of group III nitrides and group II oxides with particular reference to h-AlN and h-ZnO. This material concept will explore the approach of metal organic chemical vapor deposition (MOCVD) of h-AlN and h-ZnO on large-area SiC-supported graphene templates, thereby allowing their rational and controllable deposition in order to ensure any industrial relevance. Our strategy is to take the research from the initial materials identification through to final proof-of-concept fabrication of van der Waals stacks of few-layer h-AlN and h-ZnO with graphene by carrying out investigation and optimization of the deposition processes, extensive materials characterization studies, and theoretical modeling. This project defines a new research field of layered materials "beyond graphene". We pioneer technologically relevant solutions for innovative, original and unexplored graphitic films of h-AlN (group III nitrides) and h-ZnO (group II oxides) with tunable properties and new functionality. A strong potential synergy between the GRIFONE project and Graphene Flagship Core project is foreseen in knowledge transfer and multiplication of the team merits. The strategy of the proposed project is a means to build synergy in layered materials and nano-device research.

Consortium

Anelia Kakanakova - Linköping University - Sweden - Funded by: VR & Vinnova - (Coordinator)
Patrick Fiorenza - Consiglio Nazionale delle Ricerche - Italy - Funded by: MIUR
Béla Pécz - Technical Physics and Materials Science, Centre for Energy Research, Hungarian Academy of Science - Hungary - Funded by: NIH