

CVD WS₂ on graphene: synthesis, properties and applications

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In this talk recent advances on the synthesis and applications of large-scale highly-crystalline 2D van der Waals heterostacks will be presented. Particular focus will be put in the heterostack obtained by directly synthesizing via chemical vapor deposition (CVD) tungsten disulfide (WS₂) on graphene [1]. It will be shown via microstructural and electronic characterization that WS₂ aligns on top of graphene with a 0° orientation, the interface is atomically sharp and the spin-orbit splitting of monolayer WS₂ on graphene is the largest reported to date [2]. Superlubric sliding of WS₂ flakes on graphene triggered by scanning probe microscopy will be discussed [3]. In virtue of its band alignment and remarkable spin-orbit splitting, this system gains strong appeal for optoelectronic and optospintronic applications. Indeed, the fabrication and performance of an entirely scalable hybrid WS₂/graphene photodetector will be presented [4].

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[3] H. Büch, A. Rossi, S. Forti, D. Convertino, V. Tozzini, C. Coletti, *Nano Research* 2018 <https://doi.org/10.1007/s12274-018-2108-7>

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