Epitaxial growth of few-layer $NbSe_2$ on graphene

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2H-$NbSe_2$ is a layered transition metal dichalcogenide that hosts a 3x3 charge density wave (CDW) under 33 K together with superconductivity below 7.2 K [1,2]. By decreasing the thickness of this material, the CDW survives but the superconducting critical temperature shrinks [2,3]. Superconducting critical temperatures between 0.65 K and 2.6 K have been reported for monolayer 1H-$NbSe_2$ on bilayer graphene on SiC grown by molecular beam epitaxy (MBE), alongside Ising superconductivity due to a broken in-plane inversion symmetry, spin-orbit coupling and in-plane confinement of the electrons [3,4,5,6,7]. We investigate the growth of graphene on 4H-SiC(0001) substrates and the subsequent synthesis of few-layer $NbSe_2$ by MBE on graphene. In particular, the growth temperature and rate of $NbSe_2$ (as given by the Nb flux) control the morphology and size of the islands, their roughness, and their polytype [8,9]. Investigations of superconductivity and charge density wave in monolayer and bilayer $NbSe_2$ will provide additional information to establish a comprehensive growth diagram of $NbSe_2$ and elucidate its electronic properties.

References

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Figures

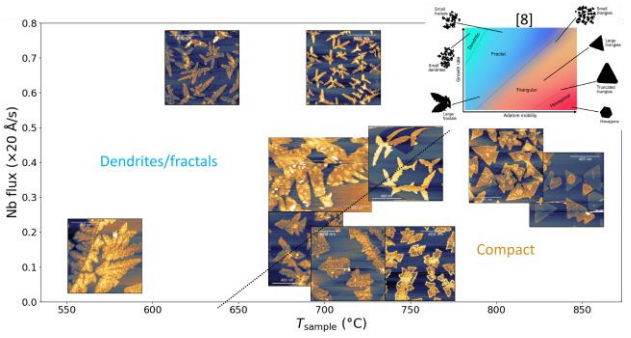

Figure 1: Morphology diagram of sub-monolayer $NbSe_2$