Sonderforschungsbereich 689
Spinphänomene in reduzierten Dimensionen

Seminarankündigung

Sprecher:  **Dr. Alexander Tonkikh**
Osram Opto Semiconductors

Ort:  PHY 9.2.01

Zeit:  Dienstag, 28. Juni 2016, 14.15 Uhr

Thema:  **Epitaxial Growth and Properties of Hexagonal-BN**

Abstract
Hexagonal-BN (h-BN) is a wide band gap semiconductor. Its crystalline structure is isomorphic to the structure of graphite. Van der Waals bonded honeycomb sheets of h-BN are dangling bonds-free allowing mechanical transfer and exfoliation of h-BN due to its inertness in the atmosphere. Thereby, h-BN is considered to be the best match to graphene for electronics and spintronics applications [1]. So far, experiments have been carried out using exfoliated h-BN flakes. Epitaxial large scale h-BN is highly desired allowing to improve the mobility of charge and spin carriers in graphene devices, but also to serve as a perfect tunnel injection barrier for graphene-h-BN or ferromagnet-h-BN spin filters and magnetic tunnel junctions (MTJs).

The honeycomb h-BN sheets are well lattice parameter-matched to close-packed surfaces of transition metals, e.g. fcc-Ni(111), hcp-Co(0001), and fcc-Cu(111). Recently, we have reported on the successful growth of h-BN on single crystal Ni(111) by applying molecular beam epitaxy [2]. However, commercially available single crystal metals are expensive and their surface is rough (rms ~10 nm) in comparison to semiconductor wafers or to sapphire (rms < 1 nm). Therefore, device- and industry-oriented applications of such grown h-BN are difficult. An alternative route towards epitaxial h-BN would be to grow it on an epitaxial transition metal, which is grown on a semiconductor or on a sapphire substrate.

In my talk the results of epitaxial growth of h-BN on transition metal-buffered c-plane sapphire will be discussed. The method of the h-BN growth is adopted from our previous study and includes RF-plasma deposition of nitrogen together with the deposition of boron from a high temperature effusion cell [2]. The results of our growth experiments along with the properties of h-BN and magnetic properties of hexagonal Co-BN-Co MTJs will be presented and discussed.