



量子物理学・ナノサイエンス第 186 回セミナー

Low Dimensional Systems on Silicon Carbide Surfaces

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場所 : 本館 2 階 H284A 物理学系輪講室

概要

Silicon carbide is a wide band gap semiconductor which has attracted a lot of interest due to its physical properties making this material particularly suitable for high temperature, high power and high frequency applications. The different SiC polytypes show a great variety of surface reconstructions which were extensively studied in the last decades. Now, we have reached the point where the surface reconstructions are sufficiently well understood and controlled to move to the next step and use them as a template to create new nanostructures and low dimensional systems.

In this presentation, I will address two examples of these low dimensional nano-objects created on silicon carbide surfaces.

In the first part, I will concentrate on the cubic 3C-SiC and more particularly on hydrogen adsorption on the 3C-SiC(001)- 3×2 surface reconstruction. I will explain how, by combining valence-band photoemission, ab-initio calculations and vibrational spectroscopies, we could establish the formation of nano-tunnels due to hydrogen atoms interaction with the subsurface region of the semiconductor [1]. In a second part, I will focus on graphene on hexagonal 6H-SiC samples. Silicon intercalation under the carbon terminated ($6\sqrt{3}\times 6\sqrt{3}$)R30 layer was followed step by step by means of core level photoemission spectroscopy. The results show that sequences of Si deposition and annealing can lead to a fully decoupled graphene layer on 6H-SiC(0001). For partial decoupling, we can evidence the formation of nanometric metal-semiconductor heterojunctions.

- [1] P. Soukiassian, E. Wimmer, E. Clasco, C. Giallombardo, S. Bonanni, L. Vattuone, L. Savio, A. Tejada, M. Silly, M. D'angelo, F. Sirotti and M. Rocca, *Nature Communications* **4**, 2800 (2013)
- [2] M. Silly, M. D'angelo, A. Besson, Y.J. Dappe, S. Kubsky, G. Li, F. Nicolas, D. Pierucci and M. Thomasset, *Carbon* **76**, 27 (2014)

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