SFB1242

SFB 1242 Nichtgleichgewichtsdynamik kondensierter Materie in der Zeitdomäne

UNIVERSITÄT DUISBURG ESSEN

Open-Minded

**08.10.2024 / 14 Uhr c.t., Raum MG 272**
**Campus Duisburg**

# Metal intercalation of graphene and the paradox of broad diffraction spots


## Prof. Dr. Michael C. Tringides

Iowa State University



Metal intercalation of graphene is a general way to tune its band structure and grow novel type of 2-d materials. The tuning depends on how the intercalated atoms can be directed to specific locations under graphene. Examples will be given for rare earth intercalation under graphene on SiC. Using high resolution surface diffraction (SPA-LEED) Dy intercalation location was determined from quantitative analysis of the diffraction patterns [1]. ARPES, STM and STS experiments were used to study changes of the band structure of graphene intercalated with Gd [2].

Paradoxically a broad diffraction feature was found to be a marker of high quality graphene. This Bell-Shaped-Component (BSC) was observed in the literature over the last 20 years but never commented on [3]. The BSC is also seen in Gr/Ir(111)[3] and h-BN/Ir(111) [4]. Despite the BSC being such a strong effect and present in different types of 2-materials, theoretical work to explain its intensity and spread lacks behind. A plausible and universal explanation is electron confinement unique to 2-d materials because of their unprecedent thickness uniformity. The wavevector of the confined electrons spreads according to the uncertainty principle [5], which generates the BSC during electron scattering.

In collaboration with S. Chen, P. A. Thiel (deceased), M. Kolmer, A. Kaminski, Y. Han, J. W. Evans, M. Horn von Hoegen, M. Petrovic, F.-J. Meyer zu Heringdorf.



[1] S Chen et al., Phys. Rev. B **107**, 045408 (2023).
[2] M Kolmer et al., J. Phys. Chem. Lett. **13**, 11571 (2022).
[3] S. Chen, et al., Phys. Rev. B. **100**, 155307 (2019); S. Chen et al., J. Phys. Chem. Lett. **11**, 8937 (2020).
[4] K. Omambac et al., Appl. Phys. Lett. **118**, 241902 (2021); M. Petrovic et al., Nanotechnology **32**, 505706 (2021).
[5] T. Ohta et al., Phys. Rev. Lett. **98**, 206802 (2007).


Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.


Contact: Prof. Dr. Björn Sothmann, Faculty of Physics
Phone: +49 (203) 37-93330 / Mail: bjoerns@thp.uni-due.de