Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Ion irradiation of graphene on Ir(111): From trapping to blistering CHARLOTTE HERBIG, Universität zu Köln, E. HARRIET ÅHLGREN, University of Helsinki, PHILIPP VALERIUS, ULRIKE A. SCHRÖDER, ANTONIO J. MARTíNEZ-GALERA, Universität zu Köln, MOHAMMAD A. ARMAN, Lund University, JANI KOTAKOSKI, University of Vienna, JAN KNUDSEN, Lund University, ARKADY V. KRASHENINNIKOV, Aalto University and Helmholtz-Zentrum Dresden-Rossendorf, THOMAS MICHELY, Universität zu Köln — Graphene grown epitaxially on Ir(111) is irradiated with low energy noble gas ions and the processes induced by atomic collision and subsequent annealing are analyzed using scanning tunneling microscopy, low energy electron diffraction, X-ray photoelectron diffraction and thermal desorption spectroscopy. Upon room temperature ion irradiation graphene amorphizes and recovers its crystalline structure during annealing. The energetic noble gas projectiles are trapped with surprisingly high efficiency under the graphene cover up to extremely high temperatures beyond 1300K. The energy, angle, and ion species dependence of trapping are quantified. At elevated temperatures the trapped gas forms well developed and highly pressurized blisters under the graphene cover [1-3]. We use molecular dynamics simulations and ab initio calculations to elucidate the trapping mechanism and its thermal robustness. Similar trapping and blistering are observed after ion irradiation of a single layer of hexagonal boron nitride on Ir(111) and we speculate on the generality of the observed phenomena. [1] C. Herbig et al., ACS Nano 8, 12208 (2014). [2] C. Herbig et al., ACS Nano 9, 4664 (2015). [3] C. Herbig et al., PRB 92, 085429 (2015).

Charlotte Herbig
Universität zu Köln

Date submitted: 06 Nov 2015 Electronic form version 1.4