

DS 32: Invited Talk: Michael Heuken (joint session HL/DS)

Time: Thursday 12:30–13:00

Location: EW 201

Invited Talk

DS 32.1 Thu 12:30 EW 201

Industrial Aspects of 2D Nanomaterials — •MICHAEL HEUKEN^{1,2}, ANNIKA GRUNDMANN¹, MATTHIAS MARX¹, HOLGER KALISCH¹, and ANDREI VESCAN¹ — ¹Compound Semiconductor Technology, RWTH Aachen University, Sommerfeldstr. 18, 52074 Aachen, Germany — ²AIXTRON SE, Dornkaulstr. 2, 52134 Herzogenrath, Germany

2D nanomaterials such as graphene and layered transition metal dichalcogenides (MoS₂) have attracted a lot of attention. They are very promising for future (opto)electronic devices. For TMDC, the realization of industrial fabrication is still a major challenge. To deposit large-area 2D films, high-productivity MOCVD systems are attractive allowing uniform growth on large substrates. Defined precursor fluxes

and advanced temperature control enable homogeneous, precise and reproducible deposition processes. We report on the optimization of MoS₂ growth on sapphire with respect to crystal quality, i. e. large crystals, and homogeneous substrate coverage, using an AIXTRON MOCVD reactor. Molybdenum hexacarbonyl and di-tert-butyl sulfide are used as metal-organic precursors, N₂/H₂ as carrier gases. Samples are characterized via atomic force microscopy, scanning electron microscopy, photoluminescence and Raman spectroscopy. For the deposition of graphene, an established CVD technology has been developed. Roll-to-roll-deposition equipment or technology for semiconductor grade layers on 300 mm wafers are available. Details of industrial requirements, state of the art and predicted market opportunities for 2D nanomaterials will be discussed.