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The hidden structure of graphene on cm to nm scale

Dec 4 | Bldg. 101
Mon 16:00 | Seminar Room on the 1st floor

Abstract: Considering the extreme aspect ratio of synthetic graphene films of order 10^{10} , uniformity of large-scale graphene cannot be taken for granted. Chemical vapor deposition allows macroscopic single crystals to grow to near wafer-scale dimensions, despite the comparably rough catalytic metal surfaces. The following transfer process involves physical transport of the atomically thin film onto a foreign substrate, which is highly challenging without introducing damage or contamination. As large-area graphene move towards real applications, uniformity will become an increasingly important figure of merit. I will compare three emerging methods to assess the electrical quality, continuity and uniformity of large-scale graphene: laser ablation-based fast prototyping, micro four-point probes and THz time-domain spectroscopic conductivity mapping, and what can be learned about the hidden structure of graphene. Then I will turn to the other end of the length scale, and discuss the importance of edge roughness for nano-size devices, and how nanometer-smooth nanopatterning can recover the theoretically predicted behavior in quantum transport devices. Finally, I will touch upon on-chip synthesis of carbon nanotubes and on-chip *in situ*-TEM etching of graphene using micro-heater silicon chips, and insights learned from these approaches.

Peter Bøggild is professor and group leader at DTU Nanotech – Department of Micro and Nanotechnology, at the Technical University of Denmark. He has worked across numerous areas, including nano-mechatronics, nanometrology, nanotubes/nanowires, surface science, material synthesis and microfabrication, mesoscopic physics and simulations, but is now focusing on graphene and other 2D materials. Topics include quantum transport in nanopatterned graphene, molecular switches and sensors, large scale synthesis and transfer, small- and large scale metrology of 2D materials, as well as encapsulation and protective barriers. He is involved in the electronics and sensor workpackages of the EU Flagship project on Graphene research, in the DNRF centre of excellence, Center for Nanostructured Graphene, as well as coordinator of a Danish research alliance on graphene technology DAGATE. He is main cofounder and organizer of the annual international conference Carbonhagen on graphene and other 2D materials since 2010.

You are cordially invited to attend!

Special Guest Seminar