CARL VON OSSIETZKY universität OLDENBURG

Fakultät II *Informatik, Wirtschafts- und Rechtswissenschaften*
Department für Informatik

Kolloquium

Am Montag**, dem 15. Oktober 2012,** um **16:15 Uhr** hält

Dr. Tawfique Hasan
Electrical Engineering Division, Engineering Department
University of Cambridge

einen Vortrag mit dem Titel

Applications of Graphene Liquid Dispersions in Optoelectronics

Der Vortrag findet im OFFIS, Escherweg 2, Konferenzsaal F 02 statt.

Abstract:
Graphene liquid dispersions can be used in different up-scalable processes, including polymer composites for ultrafast photonics, inkjet printing as well as roll-to-roll (R2R) coating on polymeric substrates, offering an attractive proposition for manufacturability of flexible optoelectronic devices. I will discuss four specific applications using such dispersions. The first example focuses on tunable ultrafast mode-locked and Q-switched laser pulse generation using graphene as a broadband saturable absorber embedded in a polymer matrix. Such pulsed sources may find a variety of applications including telecommunication, sensing, materials processing and surgery. I will next talk about inkjet printing of graphene dispersions using a commercial inkjet printer head. We achieve mobilities of up to ~95 $cm^2V^{-1}s^{-1}$ with an ON/OFF ratio of 10 in our printed devices. When printed with semiconducting polymers, the mobilities improve by ~150% with an ON/OFF ratio of 10^4. Inkjet printing of graphene promises a new library of materials, alternative to traditional polymers and metal nanoparticles. I will then move to graphene based TCE fabrication by employing rod coating on a polymeric substrate. The TCE coating have ~900Ω/□ sheet resistance with <5% standard deviation and >90% transparency in the visible spectrum with <2% standard deviation in optical uniformity across ~200cm^2. I will demonstrate two prototype devices using this TCE: an electrically switchable smart window (ESSW) acting as an optical shutter for privacy applications among others and an electrotactile (ET) device, for location specific haptic feedback for touch-screens. The 120cm^2 flexible ESSW exhibits ~60% electric field induced light transmittance even under flexion. When OFF, the device transmits <0.25%, giving a >230 contrast ratio. The ET device, on the other hand, is capable of delivering location specific tactile textures with a flexible form factor by exploiting electrovibration to enable on-demand control of the frictional force between the user's fingertip and the device surface. The physical realization of the 25 cm^2 ET device is a <130μm optically transparent (>76%) structure that can be overlaid unobtrusively on top of a display. The localized tactile sensation is delivered directly to the user's skin, without moving parts, with a peak power consumption one order of magnitude lower than traditional electromagnetic vibrators. The ET device is then integrated through a controller to generate a range of stimulating signals according to a set of MP3 audio files stored in a phone.

Biography:
Dr. Tawfique Hasan gained his PhD from University of Cambridge. His earlier work concerned with nanotube liquid dispersions and polymer composites for photonic applications with Profs Bill Milne and Andrea Ferrari. He also demonstrated charge transfer in nanotube bundles through systematic identification of excitonic energy transfer fingerprints in photoluminescence excitation maps. In 2009, he was the first to demonstrate Graphene as a saturable absorber to generate ultrafast laser pulse, essentially kick starting the field of ultrafast graphene photonics. He was elected a Research Fellow in Engineering at King's College, Cambridge in 2009. In 2011, he was awarded a prestigious Royal Academy of Engineering Research Fellowship for 5 years on 'Fully flexible graphene-based transparent conductors'. He recently demonstrated inkjet printing of solution processed graphene for high performance printed electronic devices, opening the way for wearable electronics on a variety of substrates. Dr. Hasan specializes in solution processed 1, 2D nanomaterials and their spectroscopy targeting up-scalable engineering applications including ultrafast photonics, inkjet printing and transparent conductors for flexible, electrically switchable smart windows and location specific haptic feedback surfaces for next generation touch screens. To date, Dr. Hasan has published over 30 peer reviewed journal articles and 2 book chapters, with over 1500 citations to his work.

Eingeladen von: Prof. Dr.-Ing.habil. Sergej Fatikow

Weitere Kolloquiumstermine sind im WWW abrufbar.