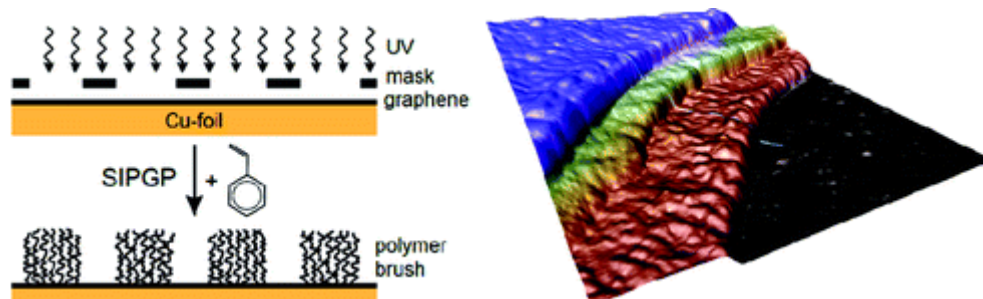


- Polymer Brushes on Graphene

Steenackers, M.; Gigler, A. M.; Zhang, N.; Deubel, F.; Seifert, M.; Hess, L. H.; Lim, C. H. Y. X.; Loh, K. P.; Garrido, J. A.; Jordan, R.; Stutzmann, M.; Sharp, I. D. *J. Am. Chem. Soc.* **2011**, *133*, 10490-10498.

Abstract:

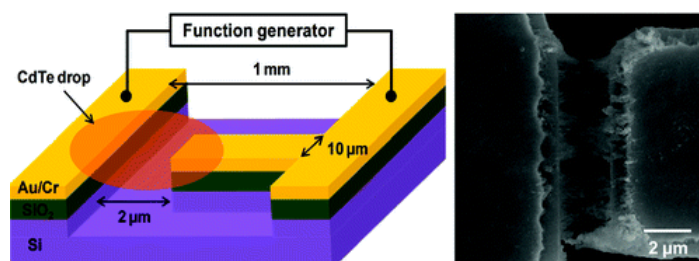


A critical bottleneck for the widespread use of single layer graphene is the absence of a facile method of chemical modification which does not diminish the outstanding properties of the two-dimensional sp² network. Here, we report on the direct chemical modification of graphene by photopolymerization with styrene. We demonstrate that photopolymerization occurs at existing defect sites and that there is no detectable disruption of the basal plane conjugation of graphene. This method thus offers a route to define graphene functionality without degrading its electronic properties. Furthermore, we show that photopolymerization with styrene results in self-organized intercalative growth and delamination of few layer graphene. Under these reaction conditions, we find that a range of other vinyl monomers exhibits no reactivity with graphene. However, we demonstrate an alternative route by which the surface reactivity can be precisely tuned, and these monomers can be locally grafted via electron-beam-induced carbon deposition on the graphene surface.

- Spontaneous Self-Organization Enables Dielectrophoresis of Small Nanoparticles and Formation of Photoconductive Microbridges

Jung, S.-H.; Chen, C.; Cha, S.-H.; Yeom, B.; Bahng, J. H.; Srivastava, S.; Zhu, J.; Yang, M.; Liu, S.; Kotov, N. A. *J. Am. Chem. Soc.* **2011**, *133*, 10688-10691.

Abstract:

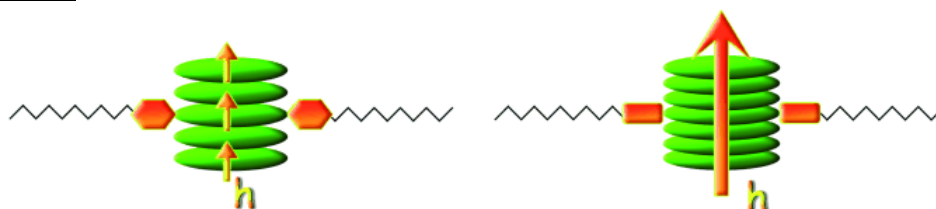


Detailed understanding of the mechanism of dielectrophoresis (DEP) and the drastic improvement of its efficiency for small size-quantized nanoparticles (NPs) open the door for the convergence of microscale and nanoscale technologies. It is hindered, however, by the severe reduction of DEP force in particles with volumes below a few hundred cubic nanometers. We report here DEP assembly of size-quantized CdTe nanoparticles (NPs) with a diameter of 4.2 nm under AC voltage of 4–10 V. Calculations of the nominal DEP force for these NPs indicate that it is several orders of magnitude smaller than the force of the Brownian motion destroying the assemblies even for the maximum applied AC voltage. Despite this, very efficient formation of NP bridges between electrodes separated

by a gap of 2 μm was observed even for AC voltages of 6 V and highly diluted NP dispersions. The resolution of this conundrum was found in the intrinsic ability of CdTe NPs to self-assemble. The species being assembled by DEP are substantially bigger than the individual NPs. DEP assembly should be treated as a process taking place for NP chains with a length of ~ 140 nm. The self-assembled chains increase the nominal volume where the polarization of the particles takes place, while retaining the size-quantized nature of the material. The produced NP bridges were found to be photoactive, producing photocurrent upon illumination. DEP bridges of quantum confined NPs can be used in fast parallel manufacturing of novel MEMS components, sensors, and optical and optoelectronic devices. Purposeful engineering of self-assembling properties of NPs makes possible further facilitation of the DEP and increase of complexity of the produced nano- and microscale structures.

- High Charge Mobility in Discotic Liquid-Crystalline Triindoles: Just a Core Business? García-Frutos, E. M.; Pandey, U. K.; Termine, R.; Omenat, A.; Barberá, J.; Serrano, J. L.; Golemme, A.; Gómez-Lor, B. *Angew. Chem. Inter. Ed.* **2011**, *50*, 7399–7402.

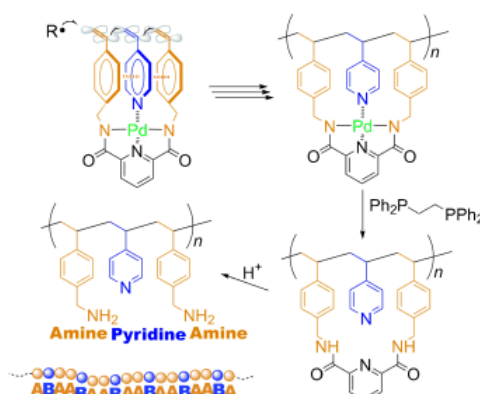
Abstract:



The stacking order and distance in columnar phases of triindole-based liquid crystals is controlled by an ethynyl linker (see picture; orange rod) between the central triindole core (green) and the peripheral flexible chains of a discotic mesogen. Hole (h) mobility is very high even if the stacking distances is not very short and the conjugated system is not particularly extended.

- Sequence-Regulated Radical Polymerization with a Metal- Templated Monomer: Repetitive ABA Sequence by Double Cyclopolymerization Hibi, Y.; Ouchi, M.; Sawamoto, M. *Angew. Chem. Inter. Ed.* **2011**, *50*, 7434–7437.

Abstract:



Two is better than one: Repetitive ABA sequences in copolymers were obtained by a palladium-templated monomer. Crucial in the polymerization were π - π -stacking interactions between aromatic side groups to array three vinyl groups (see picture). Because of the interactions double cyclopolymerization at the palladium-templated monomer was possible. Removal of the template led to sequence-regulated copolymers.