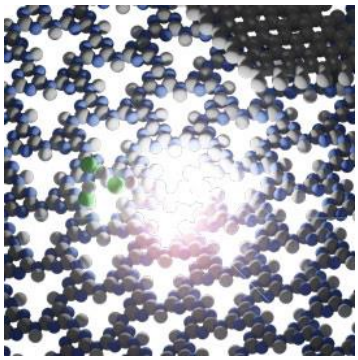
Scientific Highlight

Sparking electroluminescence in poly(triazine imide) films

A team of researchers from King's College London, Humboldt-Universität zu Berlin, Carl von Ossietzky Universität Oldenburg, and Helmholtz-Zentrum Berlin (HZB) have investigated the synthesis, structure, optical properties of poly(triazine imide), a member of the family of graphitic carbon nitrides. Their progress on material quality and processing allowed for construction of the first single layer, organic light emitting device (OLED) with a solution-processed graphitic organic material as a metal-free emission layer.

Organic semiconductors have sparked great interest in academic and industrial circles over the last decades, because of their advantageous properties such as (i) a high absorption coefficient compared to conventionally used silicon as well as (ii) less energy intensive production, and (iii) composition from earth-abundant elements. Progress in this field of research promises new, cost- and energy-efficient technologies in consumer electronics, smart packaging, and flexible light-emitters.



Hitherto explored organic semiconductors often suffer from degradation processes and defects especially when electrochemically altered ("doped"), due to dopant drift and migration or due to oxidation when exposed to atmospheric conditions. The unique properties of poly(triazine imide) enable the research to address the issues that plague conventional organic semiconductors. Poly(triazine imide) is a very stable under heat and air. Furthermore, the graphitic morphology of poly(triazine imide) allows exfoliation of the material into thin, solution-processable layers, while at the same time reducing migration and drift of chemically bonded dopants.

"With the improved material quality, we are now able to dive deeper into the more delicate features of this material, such as the electronic structure and vibration modes. This will greatly improve our understanding of this material, as well as related materials, and help us improving OLED performance and think about future, high-value applications of poly(triazine imide).", says David Burmeister, PhD student at IRIS Adlershof member Michael J. Bojdys.

Optimized synthesis of solution-processable crystalline poly(triazine imide) with minimized defects for OLED application
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