Polycyclic Aromatic Dicarboximides: Versatile π-scaffolds for Organic Electronics

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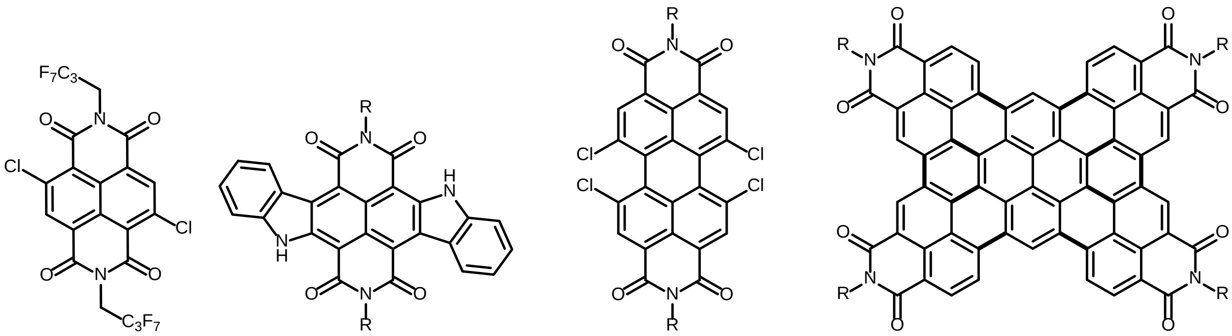
The development of organic electronic materials has always been spearheaded by electron rich molecules, e.g. amorphous triarylamines for electrophotography, electron-rich conjugated polymers for OLEDs, or acenes and oligothiophenes for organic transistors. However, for most applications not only hole conducting (p-type) but also electron conducting (n-type) semiconductors are needed and accordingly the challenges imposed by the more critical electron conduction under ambient condition have to be addressed for a successful implementation of organic semiconductors in market products.[1]

Since more than a decade our group has worked on naphthalene and perylene bis(dicarboximides) and we could demonstrate not only ambient stable radical anions and dianions of these molecules but also ambient stable organic transistor devices with mobility of > 1 $cm^2V^{-1}s^{-1}$ for thin film transistors and up to 8.6 $cm^2V^{-1}s^{-1}$ for single crystal transistors.[2] More recently, we also approached the challenge to synthesize larger two-dimensional electron-poor nanographenes substituted with multiple dicarboximide groups.[3] With a newly developed cross-coupling-annulation cascade reaction[3] a wide variety of new polycyclic aromatic dicarboximides (PADIs) became available whose optical and electronic properties will be discussed in the talk.



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