A Photochemical Approach Towards Graphene Nanoribbons

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Abstract

As graphene is known to be a highly conductive zero band gap material, graphene nanoribbons (GNRs) are of interest as semiconducting materials for electronic applications owing to its high charge carrier mobilities.[1] Although challenging, a bottom-up approach towards their preparation is the only way to access well-defined structures.

Scholl cyclodehydrogenation is still the most exploited reaction for the cyclization of polyphenylene precursors, yielding to a variety of polycyclic aromatic hydrocarbons (PAHs) as well as GNRs.[2] Unfortunately, the Scholl cyclodehydrogenation reaction lack of selectivity, therefore limiting the variety of graphenic molecules that can be made.[3] Thus, new synthetic cyclization strategies need to be investigated in order to build new libraries of molecules, thus extending the chemical and physical properties of the obtained materials.

Here we propose a newly designed photochemical approach that consists in the irradiation of photosensitive halogenated polyphenylenic precursors yielding to PAHs and GNRs. The cyclodehydrochlorination reaction benefits of a precise regioselectivity as well as low byproduct release, resulting in a greener alternative to produce PAHs and GNRs.[4]

References

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[3] Müllen, K. et al. Nat. Chem. **6** (2014) 126; King, B. T. et al. J. Org. Chem. **71** (2006) 5067; Itami K. et al. Nat. Comm. **6** (2015) 1; Hartley, C. S. et al. Chem. Commun. **51**(2015) 7245.
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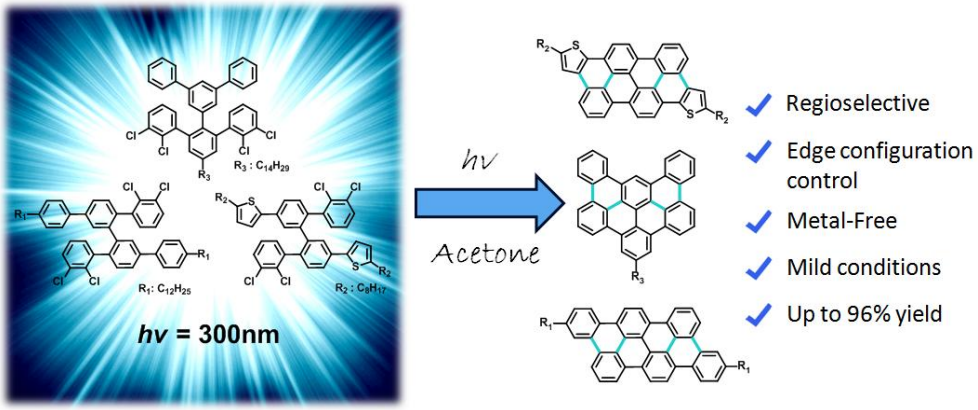
Figure



Multiple cyclodehydrochlorination reaction for nanographenes synthesis.