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From Alkyne Origami and Metal-Free C-H aminations to electron upconversion: An array of new bottom-up approaches to Carbon-rich molecules and materials

This talk will outline new strategies for assembling carbon-rich conjugated structures. In the 1st part, I present alkynes as unique high-energy synthetic precursors for extended polyaromatics, the two general patterns of oligoalkyne folding into a graphenic ribbons, and the use of supramolecular effects in the design of radical cascades.

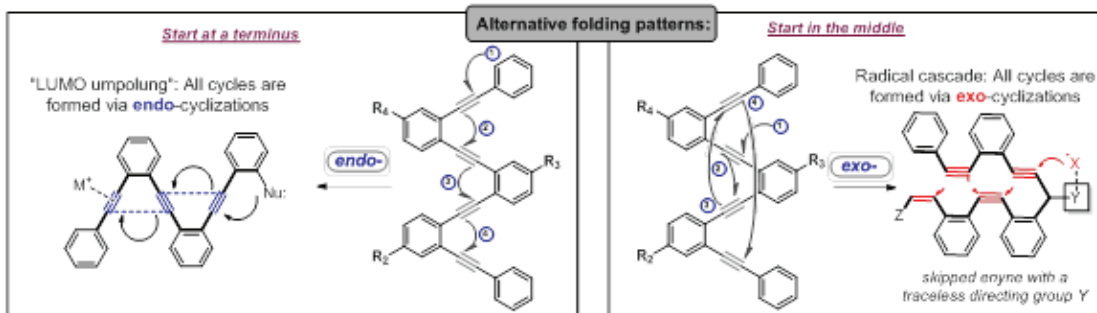
In the 2nd part, I will present a mild method for oxidative C-H amination from unprotected anilines and C(sp³)-H bonds. In this process, basic, radical, and oxidizing species work together in a coordinated sequence of deprotonation, H-atom transfer and electron transfer that forges a new C-N bond in a conceptually unique manner. This approach leads to efficient assembly of extended N-doped helicenes.

I will also introduce reductant upconversion, a new concept in catalysis, and show how it can be used to achieve the precise timing of oxidation steps in reaction cascades.

Speaker Biography

Igor V Alabugin received his Ph.D. degree from Moscow State University, Russia. After a postdoctoral study at the University of Wisconsin-Madison, he joined the Florida State University, Department of Chemistry and Biochemistry in 2000, where he is currently the Cottrell Professor. His efforts in the development of new reactions for selective DNA cleavage in cancer cells, bioorthogonal chemistry, functionalization of nanomaterials, and construction of graphene ribbons are greatly assisted by fundamental studies of stereoelectronic effects. He has published over 150 peer-reviewed research articles and a book on stereoelectronic effects. He has also given ~200 talks at conferences, universities and industries. He also serves on the editorial board of three journals. His recent awards include selection as an AAAS Fellow 2017 and Fulbright Fellow (2018).

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