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Reactivity of ynamides with tetracyanoethylene: formation of new electron super-acceptor

Tetracyanoethylene (TCNE) is well known for reacting with some electron-rich alkynes to lead to 1,1,4,4-tetracyanobutadiene (TCBD) moieties in variable yields. This reaction processes according to a [2+2] cycloaddition followed by a [2+2]retroelectrocyclization. Some of the corresponding products have interesting opto-electronic properties, in particular in non-linear optics. However, this reactivity had never been tested with ynamides, which are electron rich alkynes where a nitrogen is directly linked to the triple bond. We recently demonstrated that ynamides easily react with TCNE at room temperature to give TCBDs in generally high yields (Figure 1). This reaction is very tolerant to many substituents. These new TCBDs are electron super-acceptors: indeed, according to electrochemical studies, they can be reduced around -0.1 and -0.6 V vs. SCE (two distinct reversible reduction waves in cyclic voltametry). We showed that they could dramatically influence the absorption properties of the substrate they are linked to. We also explored the possibility to run the reaction with more complex ynamides. In the presentation, we will present the scope of the reaction with a series of various ynamides. Some original optical and electronic properties will also be discussed.



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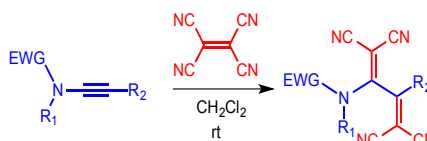


Figure 1: Formation of 1,1,4,4-tetracyanobutadienes from ynamides and tetracyanoethylene.

Biography

Yann Trolez has completed his PhD in 2010 from the University of Strasbourg under the guidance of Jean-Paul Collin and Jean-Pierre Sauvage where he worked on rotaxane-based molecular machines. He then moved to ETH Zürich in François Diederich group as a Post-doctoral fellow where he worked on alleno-acetylenic compounds bearing interesting optoelectronic properties. In 2011, he was appointed as Assistant Professor at the Ecole Nationale Supérieure de Chimie de Rennes (Univ Rennes) where he now works on organic interstellar chemistry and on new cyanated compounds having interesting optical properties. He has published about 35 papers in peer-review international journals.

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