

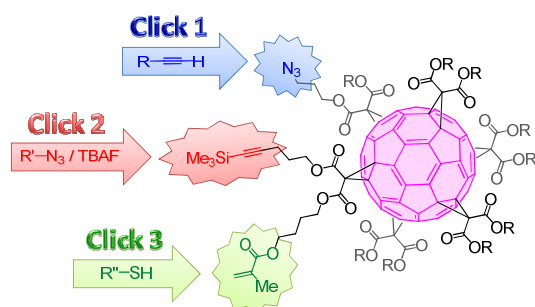
Photo- and electro-active fullerene hexakis-adducts

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Malicka, N. Armaroli, J.-M. Strub, A. Van Dorsselaer, B. Delavaux-Nicot, *Aust. J. Chem.* **2011**, *64*, 153-159.
5. P. Fortgang, E. Maisonhaute, C. Amatore, B. Delavaux-Nicot, J. Iehl, J.-F. Nierengarten, *Angew. Chem. Int. Ed.* **2011**, *50*, 2364-2367.
6. J. Iehl, J.-F. Nierengarten, A. Harriman, T. Bura, R. Ziessel, *J. Am. Chem. Soc.* **2012**, *134*, 988-998.

Fullerene hexakis-adducts with a T_h -symmetrical octahedral addition pattern are unique three dimensional molecules with an appealing compact spherical scaffold for the construction of multifunctional bioactive nanomolecules. However, the synthesis of functionalized fullerene hexakis-adducts from malonates and C_{60} is difficult thus limiting their potential applications. Actually, such compounds can be prepared in good yields from relatively simple malonates, but structurally more complicated systems are generally obtained in very low yields. In order to overcome this problem, we have recently developed simple C_{60} hexakis-adduct derivatives bearing 12 peripheral groups and shown that the copper mediated Huisgen 1,3-dipolar cycloaddition of azides and alkynes resulting in 1,2,3-triazoles is an ideal tool to efficiently produce functionalized hexa-substituted fullerenes.^{1,2} We have also developed an efficient toolbox for the synthesis of fullerene hexakis-adducts bearing two or more different peripheral functional subunits allowing us to produce unique multifunctional nanomaterials. Indeed, this has been achieved by combining the alkyne-azide click chemistry with the radical thiol-ene click chemistry for the stepwise multifunctionalization of the hexa-substituted fullerene scaffold.³



As the click reactions used for the functionalization of the fullerene core are tolerant to a wide range of functional groups, our methodology allows for the easy preparation of a large variety of unprecedented globular multifunctional electro- and photo-active nano-materials with a controlled distribution of functional groups on the spherical framework.⁴⁻⁶ The latest development within this field will be presented.

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References

1. J. Iehl, R. Pereira de Freitas, B. Delavaux-Nicot, J.-F. Nierengarten, *Chem. Commun.* **2008**, 2450-2452.
2. J. Iehl, J.-F. Nierengarten, *Chem. Eur. J.* **2009**, *15*, 7306-7309.
3. J. Iehl, J.-F. Nierengarten, *Chem. Commun.* **2010**, *46*, 4160-4162.
4. J. Iehl, M. Holler, J.-F. Nierengarten, K. Yoosaf, J. M.