Polyoxometalate mediated electron transfer for dye-sensitized transparent semi-conductors

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In the context of the ANR Project Photocarb, our goal is to build a photocathode able to reduce CO2 using solar energy. Therefore, our first challenge is to efficiently convert sunlight into reducing equivalents. Inspired by natural photosynthetic systems, we intend to promote charge separation by electron transfer cascade using polyoxometalates (POMs), since these compounds are known for their electron-accepting properties1.



To do so, we developed photocathodes through the co-grafting of a photosensitizer2 (PS) and a POM hybrid3 onto transparent semiconductors. Preliminary results will be presented, showing the contribution of POMs as electron mediators able to enhance the photo-generated current in the presence of a sacrificial electron acceptor.

 **PS vs PS+POM photocurrent**

1: M. Sadakane, E. Stechkan, *Chem. Rev.* **1998**, *98,* 219−237

2: J. Massin, M. Bräutigam, N. Kaeffer, N. Queyriaux, F. H. Schacher, J. Popp, M. Chavarot-Kerlidou, B. Dietzek V. Artero, *Interface Focus*, **2015**, *5*, 20140083

3: G. Izzet, F. Volatron, A. Proust, *Chem. Rec.* **2017**, *17*, 250 – 266