# Synthesis of Novel Porphyrin-Fullerene Dyads and Their Function in Light Induced Electron Transfer

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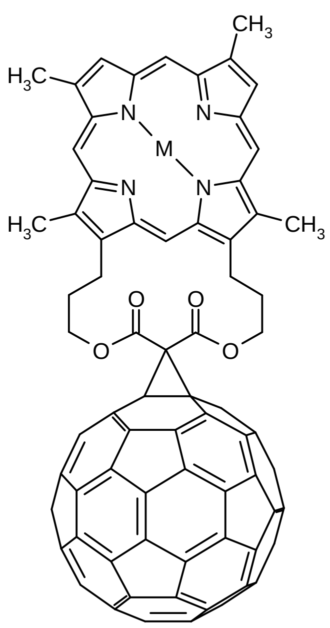
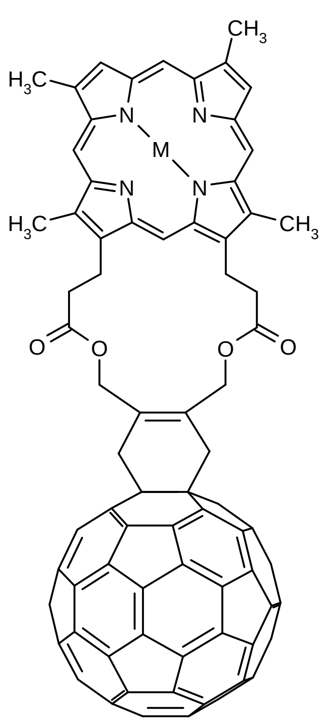
Since the discovery and availability of the fullerenes, especially $C_{60}$ was used as an electron acceptor subunit for the construction of molecular dyads which undergo light induced electron transfer. Most of the dyads or more complex structural devices contain porphyrinoid donor moieties. An advantage of fullerenes over quinones, which are used as electron acceptors by nature and in artificial photosynthetic systems, is the ability of $C_{60}$ to accept up to six electrons and is its lower reorganisation energy according Marcus´ theory.



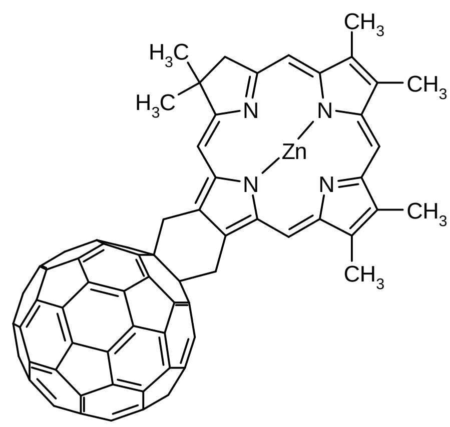

**1** M = 2 H, Zn




**2** M = 2 H, Zn

We report here on two different synthetic approaches leading to dyads consisting of fullerene acceptor subunits and different porphyrinoid donors. Partial synthesis starting from the red blood pigment heme [1,2] makes dyads of type **1** and **2** with high efficiency available in few reaction steps.

Another type of dyad **3** contains a chlorin (dihydroporphyrin) as a donor. This chlorin subunit consists of the porphyrinoid chromophore which nature uses to build the photosynthetic reaction center of cyanobacteria and plants and therefore makes the dyad **3** unique




**3**

The construction of this dyad was achieved by a total synthetic pathway [3-5]. The photophysical proprties of dyads **1**-**3** were investigated [6] whereby it was discovered that molecular oxygen plays an unique role in the light induced electron transfer processes of the dyads [7].

## References

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