Bioinspired organic electrode materials for ion batteries

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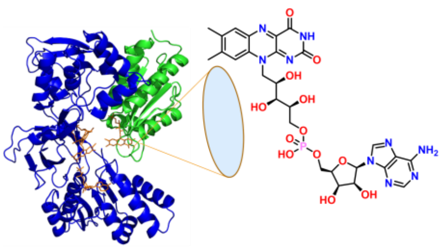
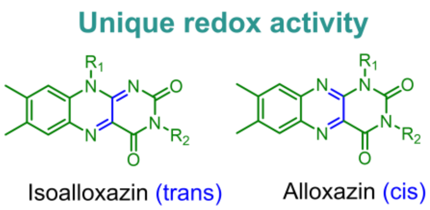
In recent years, the demand for lithium-ion (Li-ion) batteries has surged dramatically, powering a myriad of devices from smartphones to electric vehicles and reshaping the landscape of energy storage. In this context, **Li- and Na-ion battery electrodes composed of organic materials offer appealing substitutes to their inorganic counterparts**, which are often used and can have negative effects on the environment, safety issues related to thermal runaway, and supply chain hazards[1].

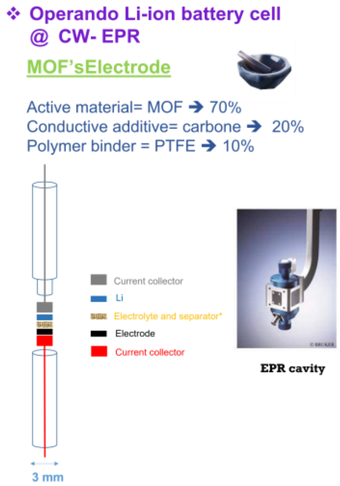
Flavins are widely distributed biological redox cofactors for a variety of bio-transformations and energy transfer reactions and promising compounds for battery applications. Due to their unique redox activity, involving three redox states (fully reduced, semiquinone, and fully oxidized) with various degrees of protonation, as well as wide possibilities for functionalization, a special emphasis was placed on systems derived from flavin-isomer alloxazine in the last five years for battery applications[2].

This project is centred on the development of bioinspired redox active (iso)alloxazine compounds as nanomaterials for rechargeable energy storage devices. New alloxazine derivatives will be synthesised and will be studied as electrode nanomaterials in an electrochemical cell specially designed for *operando* EPR spectroscopy.



Flavine Adenine Dinucleotide





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[2] W. Liu, W. Lu, H. Zhang, X. Li, Chem. Eur. J., 2019, 25, 1649-1664. a) M. Lee, J. Hong, D-H. Seo, D. H. Nam, K. T. Nam, K. Kang, C. B. Park Angew. Chem. Int. Ed. 2013, 52, 8322-8328 ; b) J. Hong, M. Lee, B. Lee, D-H. Seo, C. B. Park, K. Kang Nat. Comm. 2014, 5:5335.