

## Development of novel self-assembled nanostructures based on the supramolecular binding of viologens and ferrocyanide(II)

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Molecular self-assembled architectures are currently attracting a lot of attention as they can potentially lead to new materials with desired controllable properties.[1] Most interestingly, the use of one or more specific molecular components in such architectures with some certain functionality can result in materials with advanced properties. Our approach is related to the synthesis of through-H-bond stabilized metalorganic architectures. We herein report the synthesis and characterization of architectures based on several novel viologen/ferrocyanide(II) charge transfer complexes. Typically these materials are crystalline. The redox and photo-activity of these charge transfer complexes is of high importance for applications of such materials in molecular chromotropic as well as medium polarity sensors,[2] and finally photochromic and electrochromic materials.[3] The photochemistry of these materials is investigated in solution through various spectroscopic techniques including Nuclear Magnetic Resonance (NMR) and UV-Vis spectroscopy, as well as crystallographically in the solid state. Notable structural as well as optical and electronic variations attributed to the different substituents on the aryl-methyl-viologen (AMV) components will be analysed. Focus will also be on the role of medium polarity in the photochromism of such complexes.

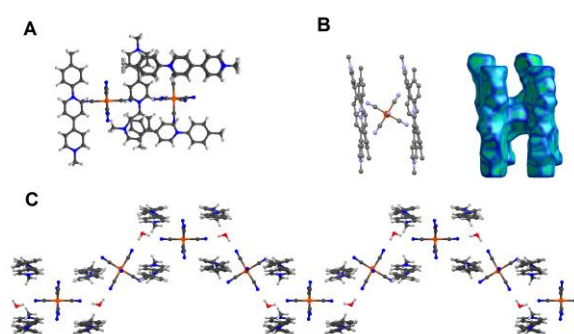


Fig.1 (A) Unit-cell of a non-symmetric viologen dication (AMV) and ferrocyanide(II) anion (FC) complex (single-crystal X-ray diffraction). (B) An FC anion “sandwiched” between two AMV cations: ball and stick diagram and Hirshfeld analysis of the three-component sandwich. (C) A zig-zag chain of AMV and FC ions and H<sub>2</sub>O stabilized with H-bonds. (C: grey, H: white, N: blue, O: red, Fe: orange).

### References

1. W. Steed, D. R. Turner and K. J. Wallace, in *Core Concepts in Supramolecular Chemistry & Nanochemistry*, Wiley, Chichester, U.K. (2007).
2. C. Reichardt, *Chem. Rev.*, **94**, 2319 (1994).
3. P. M. S. Monk, *The Viologens: Physicochemical Properties, Synthesis and Applications of the Salts of 4,4'-Bipyridine*, Wiley, Chichester, U.K. (1998).