

## 5.1 Bioorganic Semiconductor Alizarin: Structure, Properties and Metal Complexation Investigated via STM

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Alizarin (1,2-Dihydroxyanthraquinone) is a polycyclic bio-organic molecule which occurs in plants such as *Rubia tinctorium* in combination with the sugars glucose and xylose. Coordination complexes of Alizarin molecules with metal atoms are used as natural pigments since ancient times; one of the earliest known metal chelate is the Calcium Aluminum Complex of Alizarin (Alizarin[Al]), first used as a pigment in India.

We have grown supramolecular monolayers of Alizarin as well as Alizarin[Al] via Organic Solid/solid Wetting Deposition (OSWD). OSWD is a new approach which enables to deposit insoluble molecules such as organic pigments and semiconductors on substrate surfaces under ambient conditions [1]. We investigated the monolayers in order to explore the potential of OSWD grown Alizarin and Alizarin[Al] assemblies for applications within the context of NanoBioTechnology. For the investigation we used Scanning Tunneling Microscopy (STM), Nanomanipulation, Tunneling Spectroscopy (TS) and Force Field Calculations. Our results show that Alizarin and Alizarin[Al] properties are well suitable for organic electronics and – in case of Alizarin[Al] – for molecular data storage. In addition, we demonstrate that the growth of such biomolecular assemblies on mineral surfaces can also occur in non-solvent or even dry environments, which is relevant for origin of life studies.

[1] F. Trixler, T. Markert, M. Lackinger, F. Jamitzky and W.M. Heckl, *Chem. Eur. J.* 13 (2007) 7785-7790.