Investigation of molecular photosensitizer-photocatalyst microarrays *via* scanning electrochemical probe microscopy

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For the rapid evaluation of the activity of photocatalytic systems such as electrocatalysts, photocatalysts and photosensitizers, Bard and coworkers have introduced a screening technique based on the combination of scanning electrochemical microscopy (SECM) and picolitre solution dispensers [1]. Recently, scanning electrochemical cell microscopy (SECCM), a pipette-based technique, has been explore as tool for localized, maskless, 3D surfaces modifications via electro- and electroless depositions at the nanoscale level [2,3]. Using this approach, we demonstrated the electroless deposition of cobaloxime-based catalyst (CAT) microarrays and their photoactivity as function of the nature of the catalyst [4].

In this contribution, we present the co-deposition of a ruthenium-based photosensitizer and cobaloxime-based CAT for light-driven H_2 evolution reaction (HER). Depending on the PS/CAT ratio and the experimental conditions, nanowires or micro- and nanospot arrays were obtained by electroless deposition using SECCM. The HER activity under photocatalytic conditions of such arrays was locally investigated using SECM in combination to palladium- and platinum-black-modified microelectrodes [5,6]. The stability of the PS/CAT systems was also investigated using atomic force microscopy (AFM).

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