

Non volatile molecular memory devices based on switchable and bistable self-assembled monolayers of electroactive organic radicals

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The increasing interest in miniaturizing electronic devices to achieve denser circuits and memories will eventually entail the utilization of molecules as active components. In particular, self-assembled monolayers attached to substrates appear as suitable candidates in *Molecular Electronics* for the development of switchable and bistable memory devices based on electroactive molecules grafted on surfaces.[1] Polychlorinated triphenylmethyl (PTM) radicals are persistent electroactive organic radicals that can be easily reduced to the corresponding anionic species which also show a high stability in solution. Both species exhibit different optical and magnetic properties and can be reversibly interconverted in solution.[2] In addition such radicals can be covalently grafted on surfaces of different nature (Au, SiO₂) where they keep their bistability and switchability without degradation.[3-5]

Here, we describe the functionalization of transparent and conducting ITO surfaces with appropriately functionalized PTM radicals. Such hybrid organic/inorganic surfaces behave as chemical and electrochemical redox switches with bistable optical (absorption and fluorescence) and magnetic responses exhibiting an exceptionally high long-term stability and excellent reversibility and reproducibility. Moreover, such hybrid surfaces can be patterned as well as electrochemically locally addressed enabling to write-store-read information reversibly on the patterned clusters of electroactive molecules. One example of such a nonvolatile molecular memory device will be presented and discussed.

References

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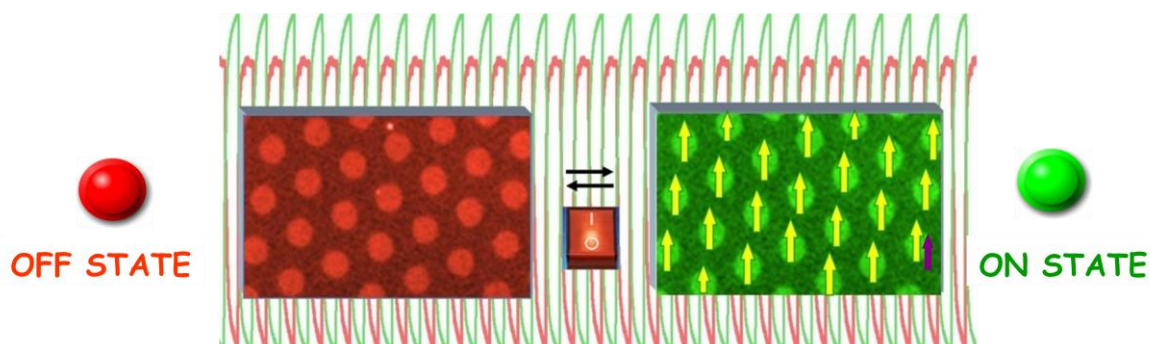


Figure. Schematic representation of the reversible switching between the two states of the hybrid organic/inorganic surfaces based on electroactive organic radicals