Control of intramolecular H-atom transfer reaction using scanning tunneling microscopy

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Molecular process is of fundamental importance in chemistry and its precise control is a key in future molecular devices. Although atomic-scale environments of a molecule are known to have a significant impact on the process, such local effects have rarely investigated at the single-molecule level. Recently we reported the direct observation and precise control of intramolecular H-atom transfer reaction, i.e., tautomerization, within a single porphycene molecule adsorbed on a Cu(110) surface using scanning tunneling microscopy [1,2]. Tautomerization is one of the important elementary processes in chemistry and biology, which also represents a molecular switch [3,4]. We demonstrated that the direct excitation of the tautomerization within a single porphycene and systematic tuning of the tautomerization rate by either putting a single metal atom nearby a molecule or changing the orientation of neighboring molecules in molecular assemblies.

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[3] P. Liljeroth et al. Science **317**, 1203 (2007).
[4] W. Auwärter et al. Nature Nanotechnology **7**, 41 (2012).