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Reversible Switching of Single FePc Molecule Structure on Giant Rashba Surface

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The Rashba system, originated from strong spin-orbit coupling induces energy band splitting for electrons of opposite spins, exhibit distinctive interactions when coupled with a magnetic impurity. Previous STM/STS studies have demonstrated that the antiphase boundary of the Rashba system BiAg2 stabilizes an alternative structure for manganese phthalocyanine (MnPc) molecules, resulting in a reversible magnetic switching system. In our research, we replaced MnPc with Iron phthalocyanine (FePc) and observed its ability to sustain two switchable phases. Notably, one of these phases manifests as a six-lobes pattern in STM topography in contrast with the previously observed four lobes, deviating from the typical molecular shape. This discovery highlights the potential unique electronic behavior of magnetic impurities within the Rashba system and may have far-reaching implications.

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