Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting information

The selective blocking of potentially catalytically-active sites on surface-supported iron oxide catalysts

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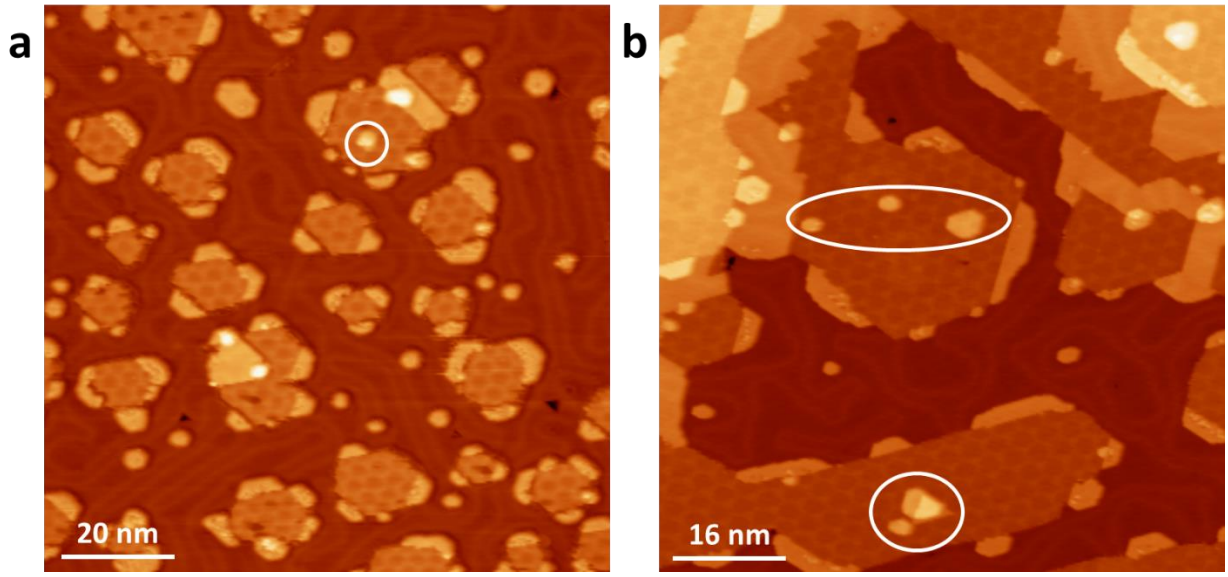

Fig. S1 (a) STM image of Pd-FeO/Au(111) with a FeO coverage of about 0.3 ML (V_{bias} = -1.7 V, I = 0.5 nA). (b) STM image of Pd-FeO/Au(111) with a FeO coverage of about 0.5 ML (V_{bias} = -1.2 V, I = 0.3 nA). White circles mark the Pd located in the interiors of FeO islands.

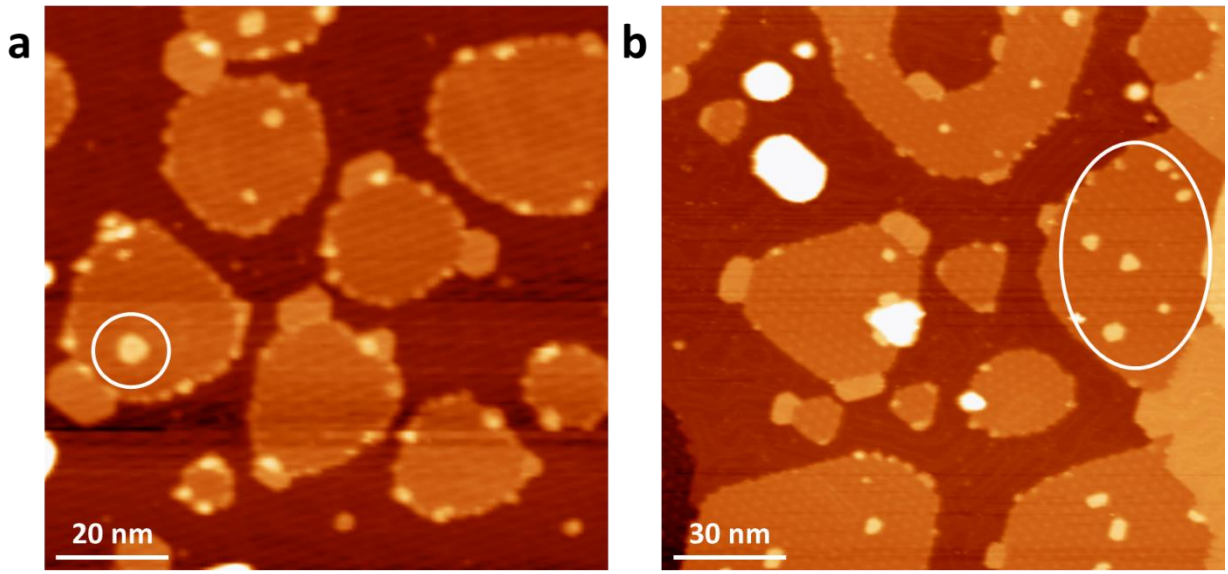

Fig. S2 (a) STM image of Pt-FeO/Au(111) with a FeO coverage of about 0.4 ML (V_{bias} = 1.6 V, I = 0.3 nA). (b) STM image of Pt-FeO/Au(111) with a FeO coverage of about 0.5 ML (V_{bias} = 1.6 V, I = 0.2 nA). White circles mark the Pd located in the interiors of FeO islands.

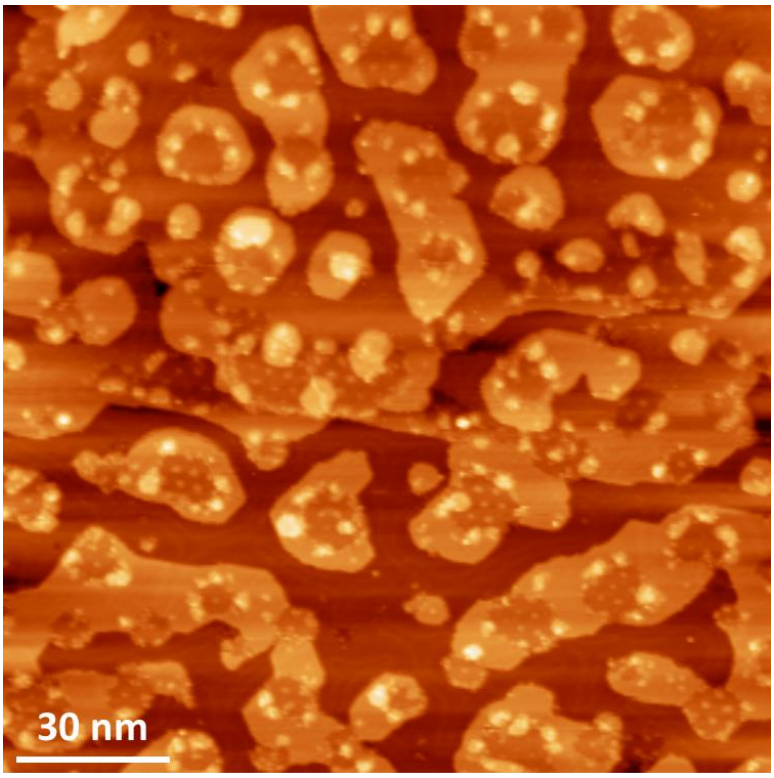

Fig. S3 High-coverage Pd deposited on FeO/Au(111) (V_{bias} = 1.5 V, I = 0.3 nA). All edges of FeO islands are covered by Pd.

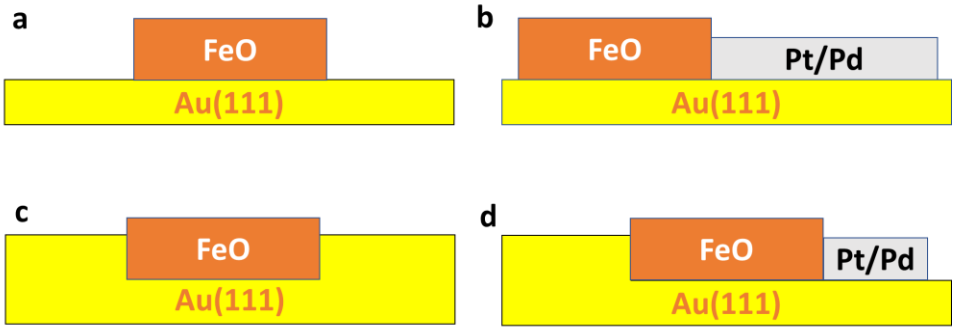

Fig. S4 Schematic diagram of interfaces in a Pt/Pd-FeO/Au(111) system. (a) Supported FeO with all edges exposed. (b) Supported Pd/Pt-FeO with one type of edge blocked, and the other type exposed. (c) Embedded FeO with all edges blocked by Au. The FeO is embedded into the center of the Au(111) terrace. (d) Embedded Pt/Pd-FeO with both Au-FeO and Pt/Pd-FeO interfaces. The FeO is embedded into the step edge of the Au(111) terrace.

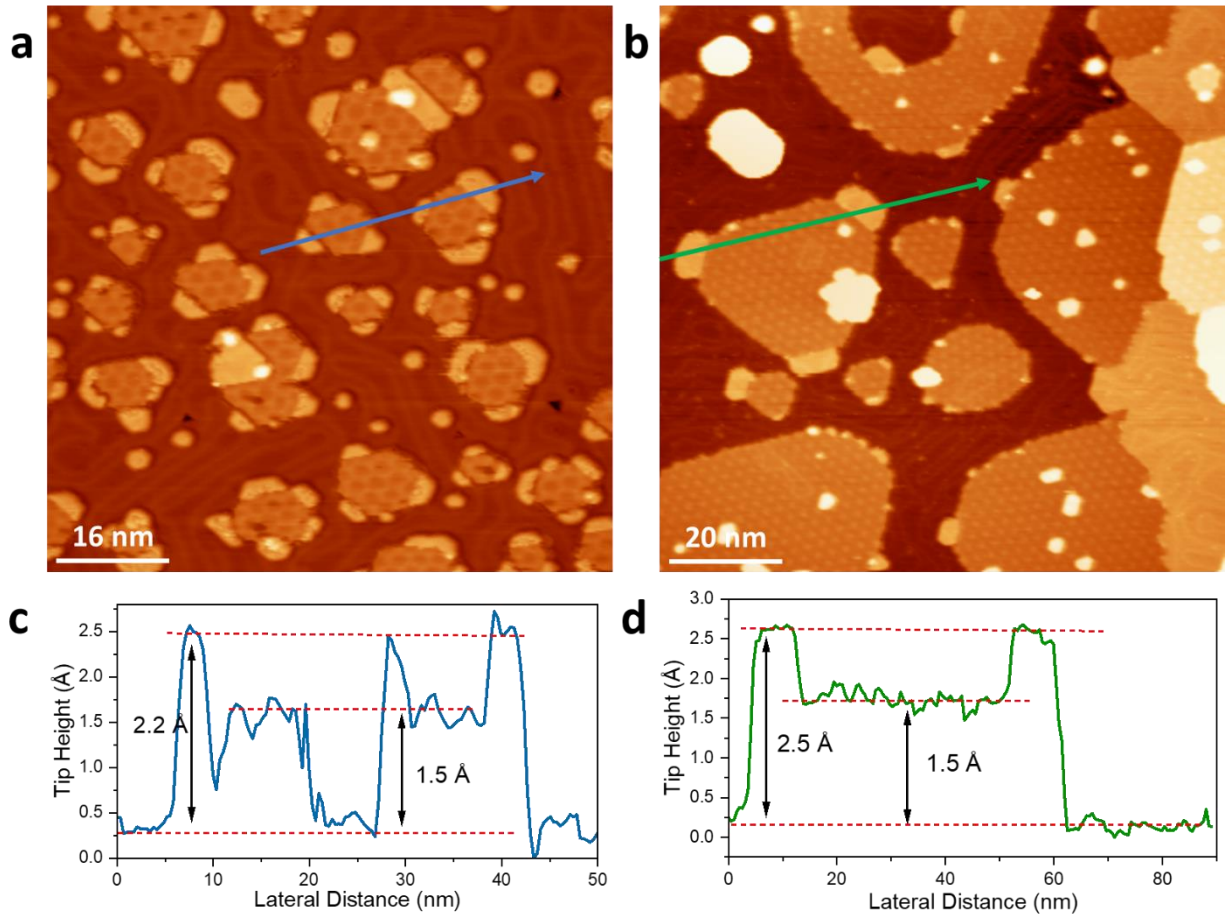

Fig. S5 STM images of Pd-FeO (a) and Pt-FeO (b) on Au(111). The line profile on Pd-FeO/Au(111) (c) indicates a height of Pd and FeO at ~ 2.2 Å and 1.5 Å, respectively, while the line profile of Pt-FeO/Au(111) (d) indicates a height of Pt and FeO at ~2.5 Å and 1.5 Å, respectively. The heights match literature reports of single-layer thick Pd, Pt and FeO films as observed with STM.[1-3]

Reference

1. A. W. Stephenson, C. J. Baddeley, M. S. Tikhov and R. M. Lambert, Nucleation and growth of catalytically active Pd islands on Au(111)-22 × studied by scanning tunnelling microscopy, *Surf. Sci.*, 1998, **398**, 172-183.
2. J.-H. Zhong, X. Jin, L. Meng, X. Wang, H.-S. Su, Z.-L. Yang, C. T. Williams and B. Ren, Probing the electronic and catalytic properties of a bimetallic surface with 3 nm resolution, *Nat. Nanotech.*, 2017, **12**, 132-136.
3. N. A. Khan and C. Matranga, Nucleation and growth of Fe and FeO nanoparticles and films on Au(111), *Surf. Sci.*, 2008, **602**, 932-942.