

表面物理化学系列讲座 Surface Physical Chemistry Lecture Series

How does the surface of an operating catalyst look like? Approaches by high-pressure scanning tunneling microscopy



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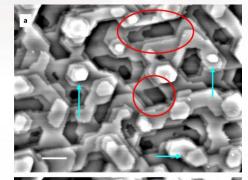
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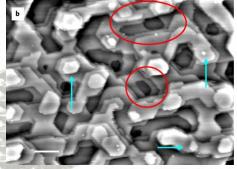
Host Prof. Kai WU 吴凯

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Abstract:

What we know about the processes on catalyst surfaces mainly stems from indirect information and from modelings of the reaction kinetics. Scanning tunneling microscopy (STM) is one of the few surface analytical techniques that can be applied at high pressures, so that it could, in inciple, provide access to the atomic structure of the surfaces of operating catalysts. However, the number of examples where this has actually been achieved has remained low, a result of many practical, experimental difficulties. In this talk, I present results of a project to solve some of these difficulties. As an example, I discuss the Cocatalyzed Fischer-Tropsch synthesis, a large-scale industrial process to produce liquid hydrocarbons from mixtures of CO and H₂ (syngas). After major efforts we finally managed to image the surface under reaction conditions and identify the active sites.





References

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- 2. C. Sachs et al., *Science* 293, 1635-1638 (2001)
- 3. B. Bernhard et al., *Nature Catalysis* 2, 1027–1034 (2019)
- 4. B. Bernhard et al., ACS Catalysis 10, 12156–12166.(2020)