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Model Catalysts as the Atomic Level: from Structure（Geometric and Electronic）to Reactivity

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（Fritz Haber Institute of the Max Planck Society）

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フロンティア応用科学研究棟　1階　セミナー室1

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Our understanding of catalysis, and in particular heterogeneous catalysis, is to a large extend based on the investigation of model systems. Increasing the complexity of the models towards supported nanoparticles, resembling a real disperse metal catalyst, allows one to catch in the model some of the important aspects that cannot be covered by single crystals alone. One of the more important aspects is the support particle interface. We have developed strategies to prepare such model systems based on single crystalline oxide films, which are used as supports for metal, and oxide nanoparticles, which may be studied at the atomic level using the tools developed in surface science. However, those oxide films may also serve as reaction partners themselves, as they are models for SMSI states of metal catalyst. Using such model systems, we are able to study a number of fundamental questions of potential interest, such as reactivity as a function of particle size and structure, influence of support modification, as well as of the environment. The thin oxide film approach allows us to prepare and study amorphous silica as well as 2D-zeolites. Those systems, in spite of their complexity, do lend themselves to theoretical modelling as has been demonstrated, and as a basis to create new model catalysts.

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Brief career:Prof. Hajo Freund received Ph.D in 1978 and Habilitation in 1983 from University of Köln. After post-doctoral works, he became scientific assistant at University of Köln in 1981. He was promoted to associate professor at University of Erlangen in 1983, and then to full professor at Ruhr-Universität Bochum in 1987. Since 1996, he is the director at Fritz-Haber-Institut of the Max Planck Society. He has been received many important awards, for example, Blaise Pascal Medal in Material Science of the European Academy of Sciences (EURASC) in 2012 and elected as Member of EURACS since 2013. As a professional service in Japan, he serves as Advisory Council in RIKEN since 2013. He is author of more than 750 publications.