

## **Catalysts Live & Up Close**

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The search for new or more effective solid catalysts would benefit when we could bridge the molecular world with the macroscopic world. Such detailed information can be realized if we would have access to a very powerful camera shooting molecular movies of an active catalytic solid at the level of single atoms and molecules. This is the field of operando spectroscopy. Recent breakthroughs in chemical imaging techniques, based on optical, electron and X-ray methods, demonstrate that such molecular movie concept is within reach. This lecture discusses the recent advances in spectroscopy and microscopy of catalytic solids at different length scales, starting from single molecules and single atoms up to the level of individual catalyst particles. Special emphasis will be devoted to the exploration of mesoscale effects as well as on the scientific challenges ahead to make such molecular movie reality.