Adding a new method to the list of single-molecule analytical techniques, researchers in Belgium have demonstrated that fluorescence microscopy can be used to monitor individual catalytic reactions that occur on the surfaces of solid catalysts submerged in reagent solution (M. B. J. Roelfers et al., Nature 2006, 439, 572). The technique, which was used to prepare still micrographs and microscopy videos, provides scientists with a new real-time and high-resolution method for probing molecular events that occur only on certain portions of catalyst surfaces. The work may broaden understanding of catalytic processes and lead to the design of new catalysts.

The new technique was applied to solution-phase reagents undergoing reactions on mineral-type catalysts. Specifically, the team used a specially configured microscope setup to probe the catalytic transformation of a nonfluorescent "reporter" compound (S-carboxyfluorescein diacetate, C-FDA) to a fluorescent product. The reactions were conducted by exposing reagent solutions to a lithium-aluminum gibbsite-type material known as a layered double-hydroxide catalyst.