Simulataneous XRF and Ptychographic imaging of FCC Particles

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While spatially resolved X-ray fluorescence (XRF) measurements provide information on element distribution, it can not compete with the spatial resolution obtained by ptychographic imaging, which in turn can not easily provide chemical information on multiple elements [1-2]. Besides this complementary nature of the two methods, their measurement schemes allow for simultaneous data acquisition [3]. By utilising the newest detector technology, the Maia detector for XRF and the Eiger X 4M for ptychography, simultaneous measurements with dwell times in the millisecond range became feasible.
Fluid catalytic cracking (FCC) is an important process in the petrochemical industry, accounting for 40-45 % of worldwide gasoline production. In FCC, catalyst particles are used to crack large hydrocarbon fractions into more valuable materials, such as gasoline and propylene [4]. During operation FCC catalyst particles accumulate metals (e.g. Fe, Ni, V, Ca, Na) that have been related to catalyst deactivation. However, detailed knowledge about metal deposition mechanisms and their effects on particle morphology and chemistry is limited. Results will be shown from imaging these fluid catalytic cracking (FCC) catalyst particles, showing the impact of aging of these industrial FCC particles on metal deposition and the availability of the active sites.

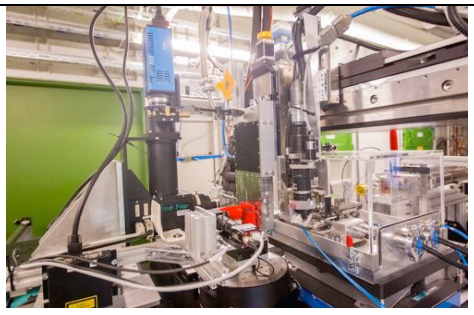

Figure 1: An overview image of the P06 microprobe, showing the Maia detector.

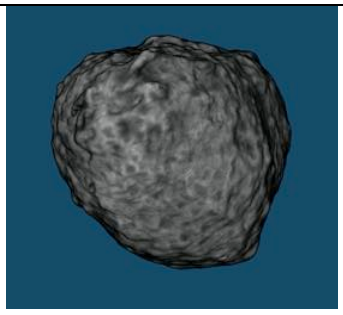

Figure 2: Showing a tomography reconstruction of an FCC particle (≈ 100 µm).

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