STRUCTURAL CHANGE OF FLUID CATALYTIC CRACKING CATALYSTS STUDY INCORPORATE WITH COKE CHARACTERIZATION FORMED IN HEAVY OIL VOLATILIZATION/DECOMPOSITION

Ye Shui Zhang, University College London, United Kingdom
yeshui.zhang@ucl.ac.uk
Paul R. Shearing, University College London, United Kingdom
Dan J. L. Brett, University College London, United Kingdom

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Porous structure change of catalyst and coke formation from feedstock on fluid catalytic cracking (FCC) catalyst have studied by a more comprehensive set of analyses, include 2D, 3D analyses incorporate with carbon/coke characterization teniques. Carbon/coke formed from a heavy oil volatilization/decomposition with different oil-to-FCC catalyst ratio (1:3, 1:2, 1:1, 2:1 and 3:1) to simulate the aging of FCC catalyst in a continuous oil refinery. Carbon/coke was formed for all used FCC catalyst samples that is generally increases with the increase of oil-to-FCC catalyst ratio. Coke formation has been correlated with the porosity change of the FCC catalyst, that more carbon/coke formed on the FCC catalyst due to the increment of oil-to-FCC catalyst ratio leads to the decrease of total pore volume and surface area. Zeolite is evenly distributed from the FCC catalyst particle centre to the exterior for all pristine and used FCC catalyst particles. The interior porous structure of single FCC catalyst particle is not affected by the coking. However, the exterior porous structure is completely disappear for all used FCC catalyst, that could cause by porous frame collapse and the coking clog the surface pores. The more comprehensive study of the structural change incorporate with the carbon/coke characterisation, which helps to understand the progressive degredation of FCC catalyst caused by porous structure change more in depth. Figure 1 is an example of 3 D tomogram and the radial distribution profiles of pristine FCC catalyst.

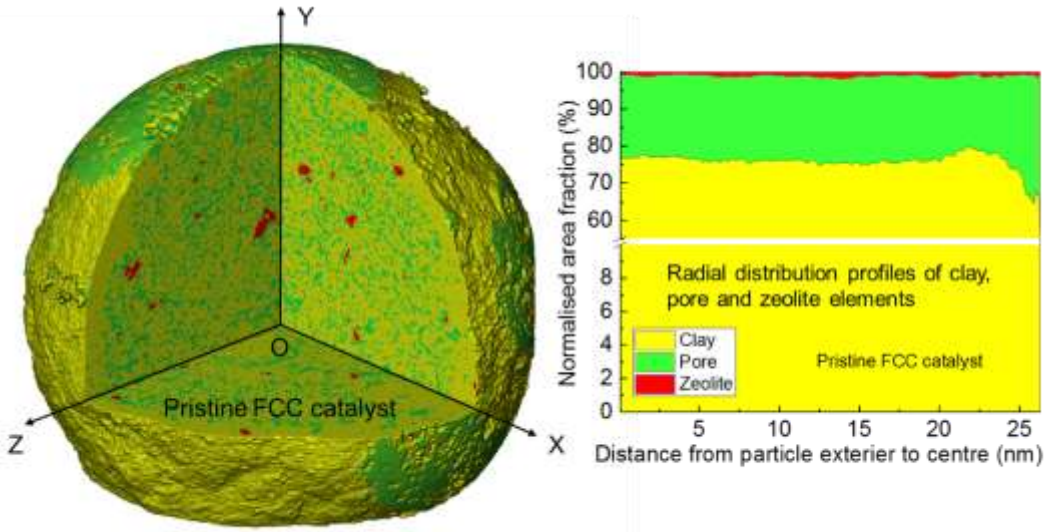

Figure 1 Resulting segmented tomogram of pristine FCC catalyst (left); Radial distribution profiles of clay, pore and zeolite elements, with respect to the particle centre, of a pristine FCC particle (right).