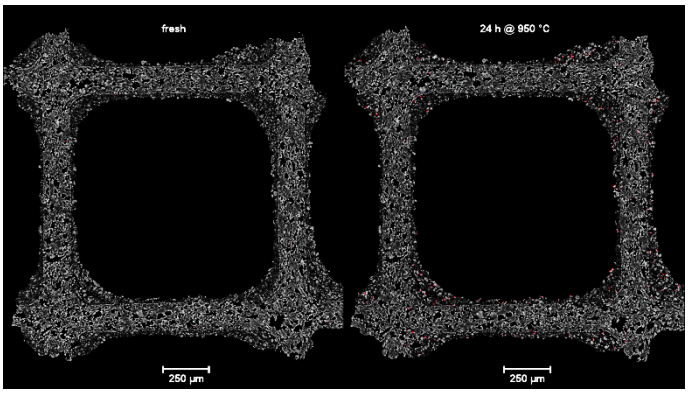
Electronic Supplementary Material (ESI) for RSC Advances.

Aging of a Pt/Al_2O_3 exhaust gas catalyst monitored by quasi *in situ* X-ray micro computed tomography

Georg Hofmann[†], Amélie Rochet[†], Elen Ogel[†], Maria Casapu[†], Stephan Ritter[#], Malte Ogurreck[*], and Jan-Dierk Grunwaldt[†]

Movies

Direct comparison of 2 raw slices of a fresh and 24 h aged sample

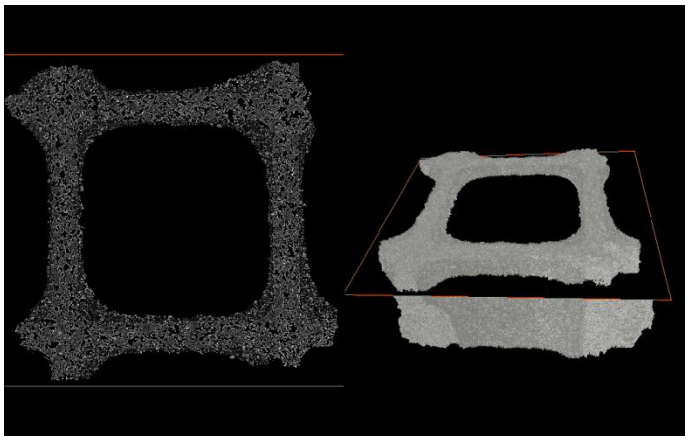


Filename: Movie1.mpg

Raw tomographic slices series of the same honeycomb channel in fresh state and after ageing 24 h @ 950 °C.

The same color scale is used. Please use pause playback function to compare single frames.

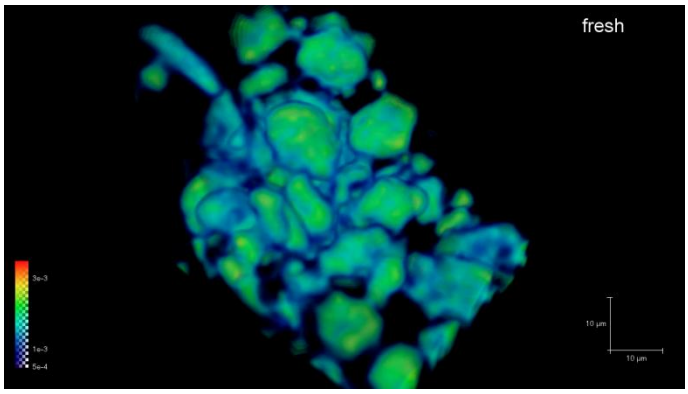
Volume stack and raw slice



Filename: Movie2.mpg

Side by side tomographic slice and corresponding volume rendering of the sample.

Animation of ageing effects on a washcoat subvolume



Filename: Movie3.mpg

In detail visualization of the absorption (proportional to the Platinum loading) in a washcoat subvolume. Distinct changes are revealed starting from the fresh sample aged for 4, 8, 12, and 24 hours at 950 °C.

Additional Figures

Blobs in the washcoat volume

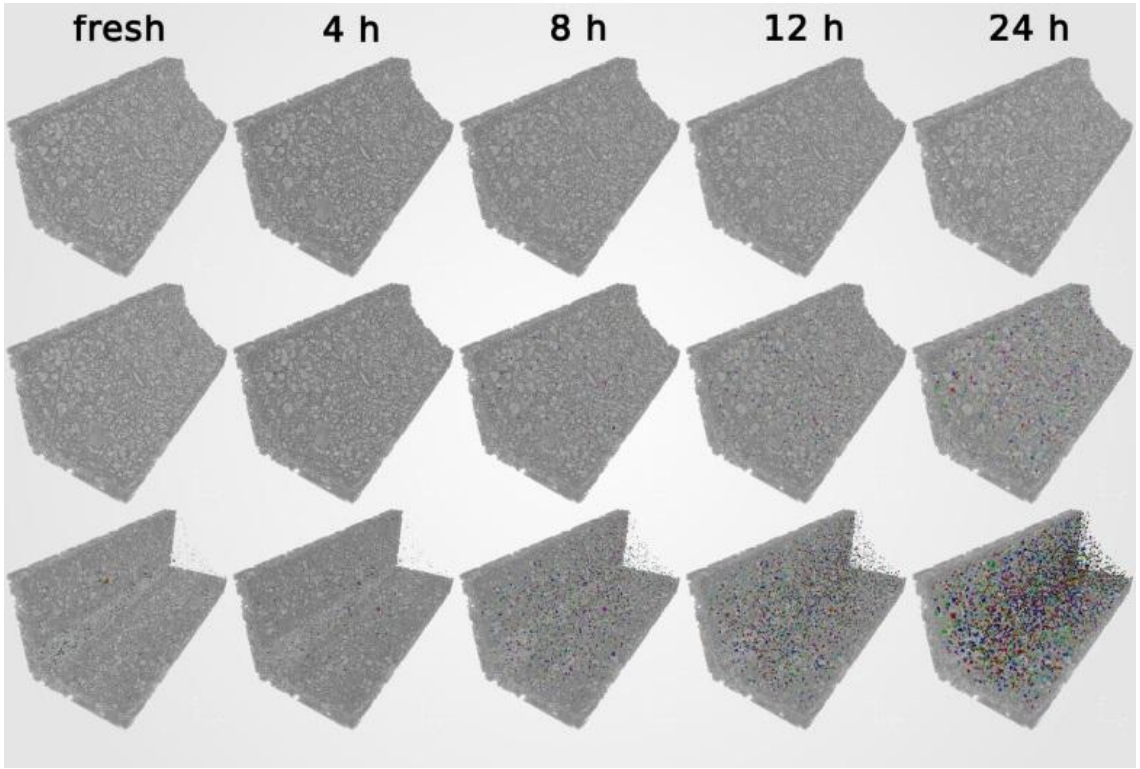


Figure S1: Volume renderings of the honeycomb corner for each ageing step. Top row pure gray scale rendering, middle row identified features on the surface, bottom row features in the complete volume.

Fullsize “View on the Washcoat”

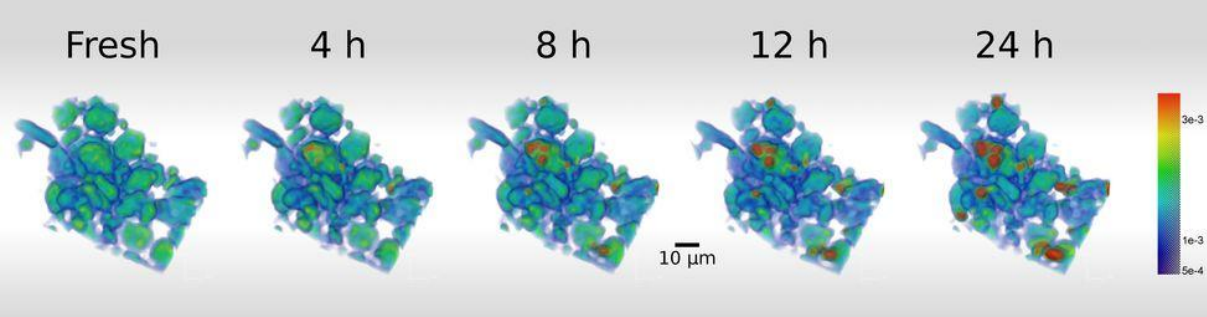


Figure S2: Full size snapshot series of Fig 11.

Comments / Further Details

BET Surface Area

According to the uncoated catalyst powders used in XRD, powder from the same batch has been studied with respect to their BET surface area. In Figure S3, the results for the presented 950 °C aged catalysts are shown including also the 750 °C series as additional information.

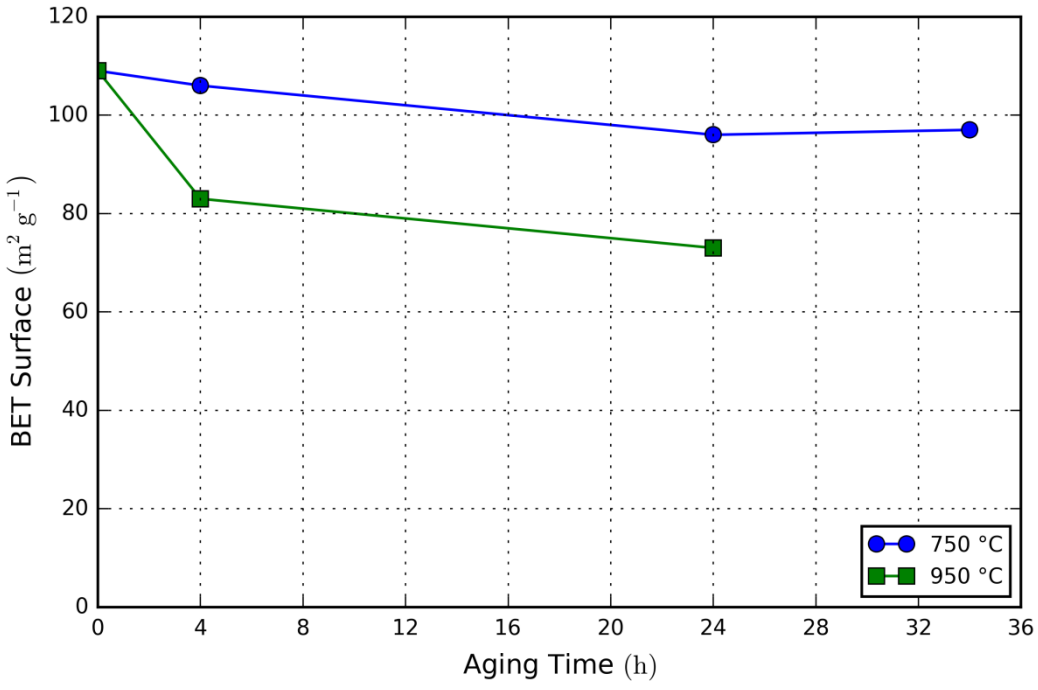


Figure S3: Plot of the BET surface for 4 wt.% Pt/Al_2O_3 powder isothermally aged in air.

The initial BET surface was about 110 m^2/g and decreased rapidly to 80 m^2/g within the first 4 hours of aging at 950 °C. However, further aging up to 24 h did not significantly reduce the BET surface area measured to be about 75 m^2/g. Similarly only minor effects were observed for the 750 °C aging series, which showed in general less impact.

The results are in line with observation made by XRD and the cited literature, stating a rapid early decrease of the surface area and slow almost linear dependence at later stages and longer time scales.