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HIGHLY INTERACTIVE SURFACES ON IMPREGNATED ELECTRODES - AN *IN OPERANDO* RAMAN SPECTROSCOPY STUDY

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Solid oxide electrodes have found application in solid oxide cells for energy conversion, i.e. for conversion of fuel into electricity (fuel cells) and for conversion of excess electricity into fuel (electrolysis cells). Furthermore solid oxide cells are applied in electrocatalytic removal of pollutants (NO_x and hydrocarbons) from diesel engine exhaust.

Improved performance may be obtained if solid oxide electrodes are prepared by impregnation, either of the entire electrode phase or of specific electrocatalysts into the electrode structure. However, the reasons underlying performance enhancement is often not well-understood.

Electrocatalytic reduction of NO_x on lanthanum strontium manganite (LSM) electrodes is increased, if the electrodes are impregnated by BaO. To investigate the origin of this performance enhancement, *in operando* Raman spectroscopy studies were performed with samples at 300-500 °C in 1000 ppm NO and 0.1 atm O_2 with balance Ar, while the electrodes were subjected to ± 1V.

Results from the spectroscopy revealed a highly interactive electrode surface, with the surface composition being strongly dependent on both the atmosphere and the applied potential. The implications of these observations for electro-catalytic removal of NO_x and for impregnated electrodes in general will be discussed. In addition, a short overview of current *in operando* Raman activities at DTU Energy will be given.

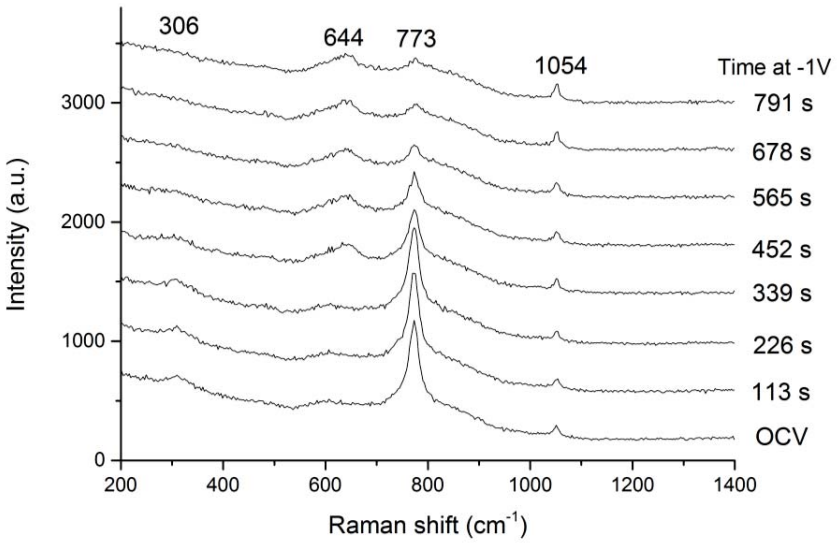

Figure 1. Raman spectra recorded on BaO impregnated LSM electrode in 0.1 atm O_2 at 300 °C