Electrocatalysis caught in the act

Traulsen, Marie Lund; Drasbæk, Daniel Bøgh; Holtappels, Peter

Published in:
Book of Abstracts Sustain 2017

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Electrocatalysis caught in the act

Marie Lund Traulsen*, Daniel Bøgh Drasbæk, Peter Holtappels

Department of Energy Conversion and Storage, Technical University of Denmark
*Corresponding author email: matr@dtu.dk

High temperature electrocatalysis plays an important role in emerging energy technologies like high temperature fuel cells and electrolyzers. A crucial parameter in the development of these technologies is the development of electrodes that show a high initial activity and furthermore are able to maintain this high activity during long-term operation. Often the durability of these electrodes is challenged by the presence of contaminants in the gas feed, coking processes, segregation in the ceramic electrode materials themselves among others, which altogether will compromise the electrode performance.

To maintain a lasting, high activity of the ceramic electrodes a clear understanding of the processes occurring on the electrodes during operation is required. However, the challenging operating conditions for these electrodes (500-800 °C, controlled atmosphere, applied electric potential), limits the "spectroscopic toolbox" which can applied during operation.

One spectroscopic tool that can be applied is Raman spectroscopy, which recently has been used to study differences in coking behavior between novel Ni and Co infiltrated perovskite electrodes. Furthermore, another recent operando Raman study shows that the surface composition of the ceramic electrodes is very dynamic, and can be controlled by the applied potential, thus the "active electrode surface" is much different from the electrode surface studied ex situ. These important findings must be taken into account in the development of new , highly active, durable electrodes for emerging energy technologies.

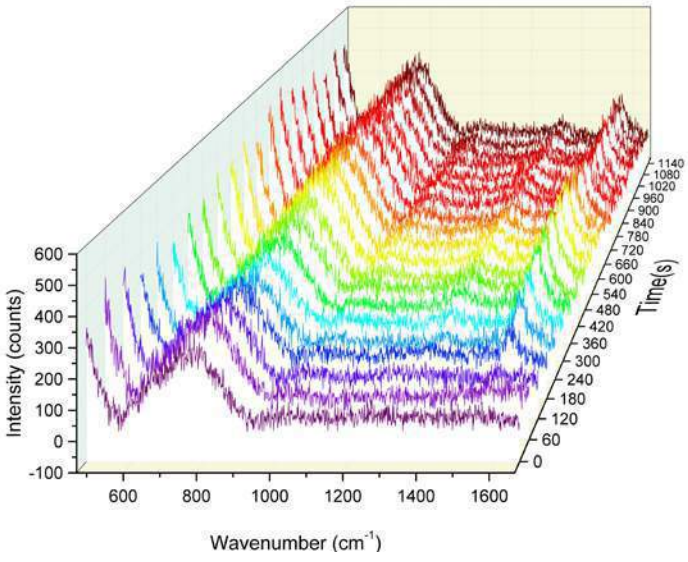

Figure 1.Operando Raman results showing graphite formation on Ni-STN based electrode at 850 °C when exposed to pure methane.