

Application of diffuse reflectance FT-IR spectroscopy to *in situ* and *operando* characterizations of catalysts and reaction mechanisms

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Diffuse reflectance FT-IR spectroscopy (DRIFTS) is one of the most widely used *operando* techniques to investigate heterogeneous catalytic reactions. Several examples illustrating the successful application of DRIFTS will be presented, including the bases for fully quantitative *in situ* and *operando* studies [1-4].

The characterisation of metal nanoparticles [2,4-6] and the mesoporosity of zeolites [7] will be discussed. Pt-Sn nanolloys and a new mode of alloy segregation triggered by CO dissociation will be highlighted [5,6]. Spectral features of CO adsorbed on Pt sites (e.g., Pt nanoalloys and nanoparticles, single Pt atoms) will be reviewed, also revealing common spectral data misinterpretation [1,8]. Overall, this presentation will emphasize the benefits that DRIFTS can bring in understanding both the structure of catalysts and the associated reaction mechanisms, through transient experiments used to discriminate reaction intermediates and spectator species.

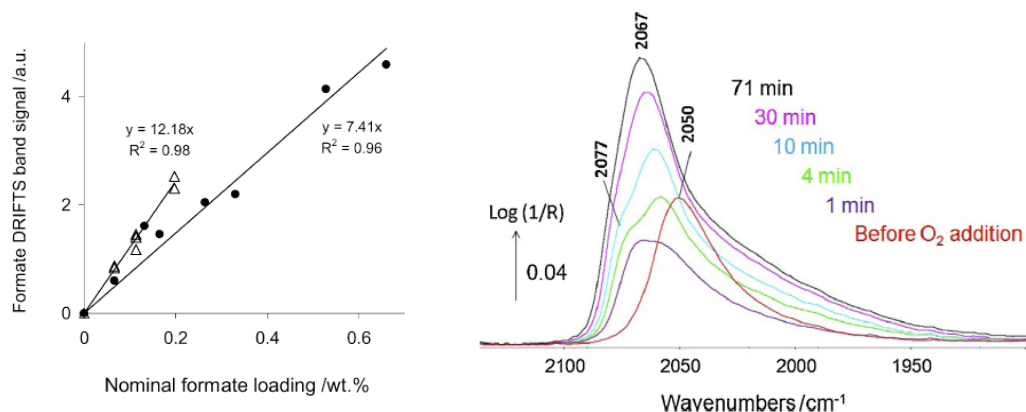


Figure 1. (Left) Examples of calibration curves used to quantify formate species over CeZrO_x (triangles) and CeO₂ (circles). (Right) Evolution of the Pt-CO signal over Pt-Sn bimetallic nanoparticles upon O₂ introduction, indicating alloy segregation.

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