## Simultaneous XRPD-MS Study on Iron Oxides Supported on Spinel-like Aluminate

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Iron oxides are suitable oxygen exchangers in redox cycles, to be employed in an innovative process of hydrogen production from natural gas [1]. Infact, these oxides, once reduced with hydrocarbons, are capable to re-oxidize by splitting [O] from water, thus producing a pure stream of  $H_2$ .

In-situ time-resolved synchrotron X-ray powder diffraction (XRPD) experiments coupled with mass spectrometry (MS) were performed on iron oxides supported on spinel-like aluminate [2], both during high temperature reduction with methane and oxidation with air.

The reactive gases were fed directly through a capillary quartz reactor containing the sample and the evolved products analyzed by an on-line connected mass spectrometer

By means of the Translating Image Plate (TIP) installed on the GILDA beamline (ESRF- Grenoble, France), the photons diffracted from the sample were collected step by step during the reaction, the translating speed determining the time resolution. The Rietveld refinement of the diffraction spectra gave the quantitative sample composition at each step of the reaction and information about the interaction of the active species with the support.

[1] EP 1134187 (19/09/2001) to Snamprogetti. [2] United States Patent Application 20040152790.

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