YSZ degradation due to oxide interaction with CuO under oxidising and reducing atmospheres

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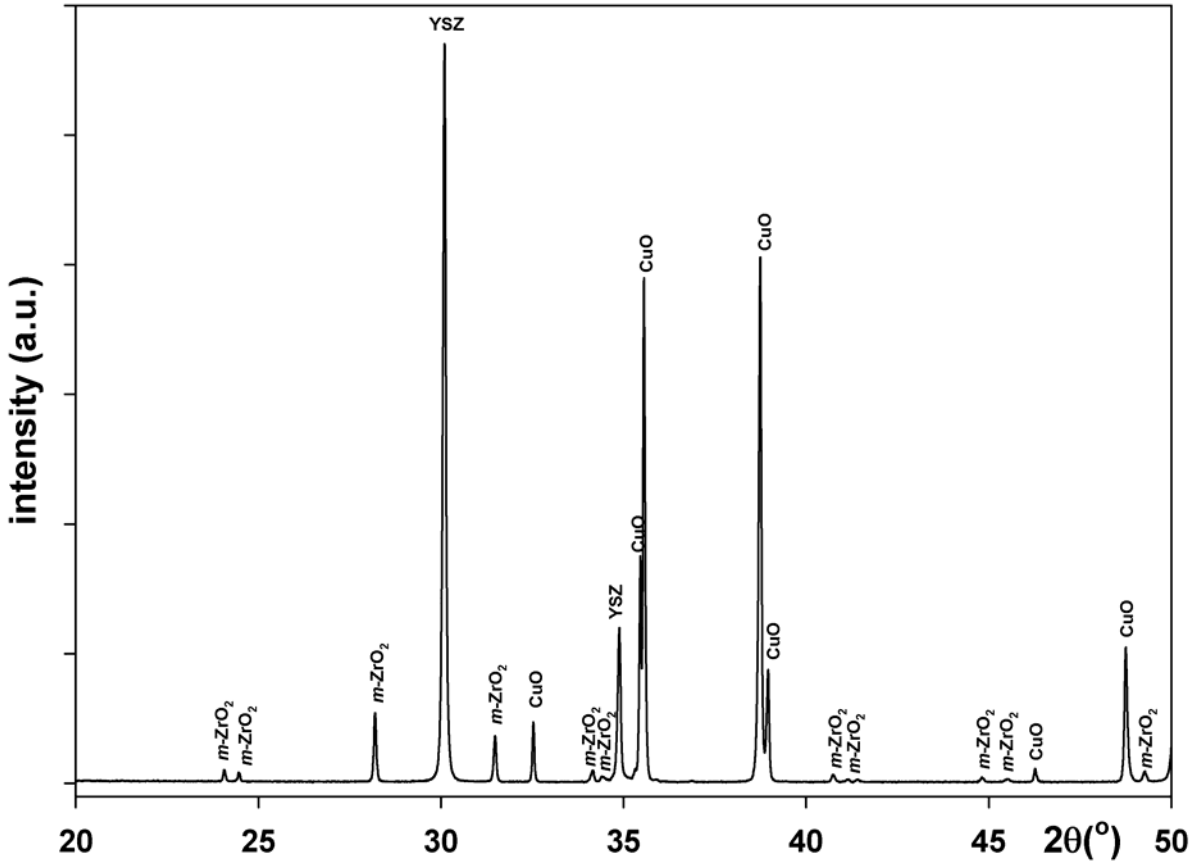

Figure 1 XRD pattern for a composite YSZ-CuO (1:1 weight), after firing in air, at 1000°C for 3h. YSZ powder was previously annealed at 1200°C for 15h.

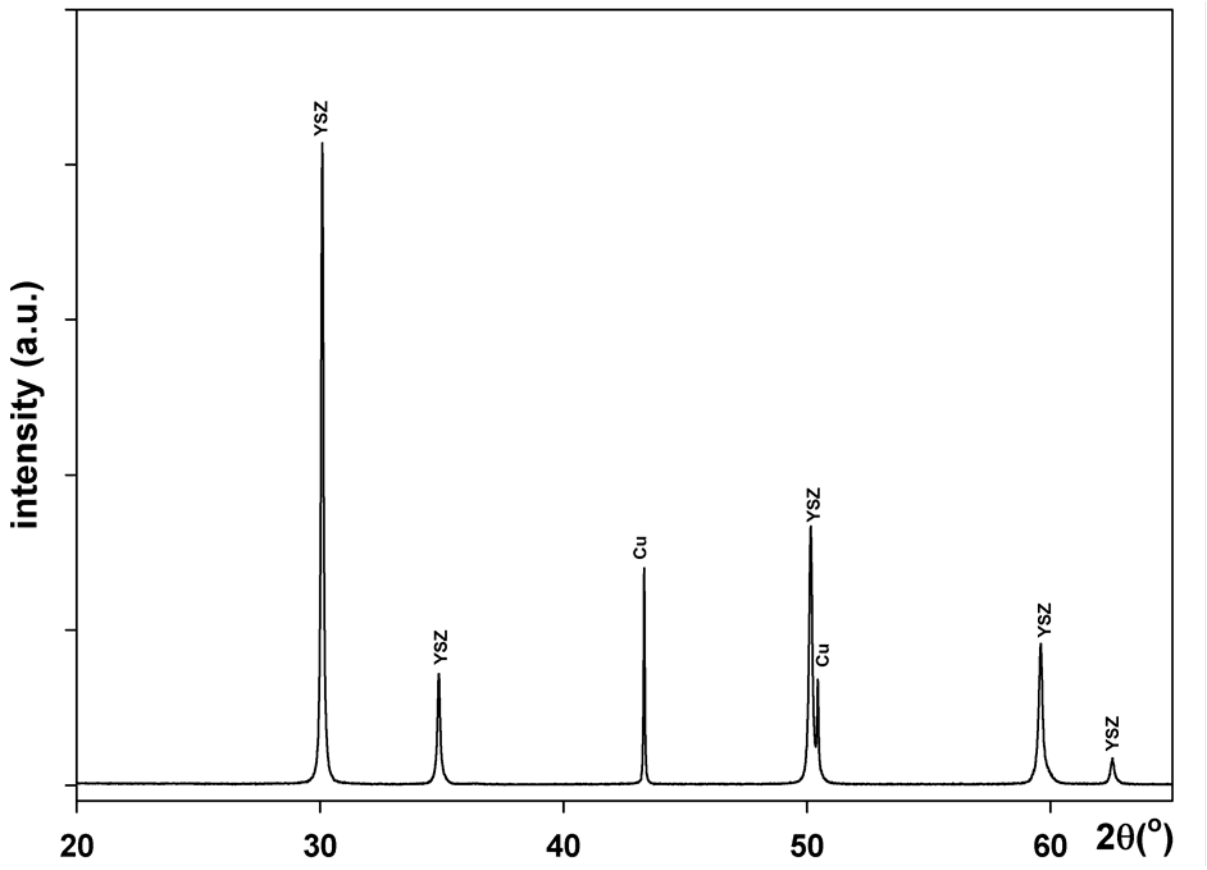

Figure 2 XRD pattern for a cermet YSZ-Cu (YSZ:CuO=3:1 weight), after firing at 950°C, under humidified 5%H_2-Ar, for 3h. No peaks from *m*-ZrO_2 were observed.

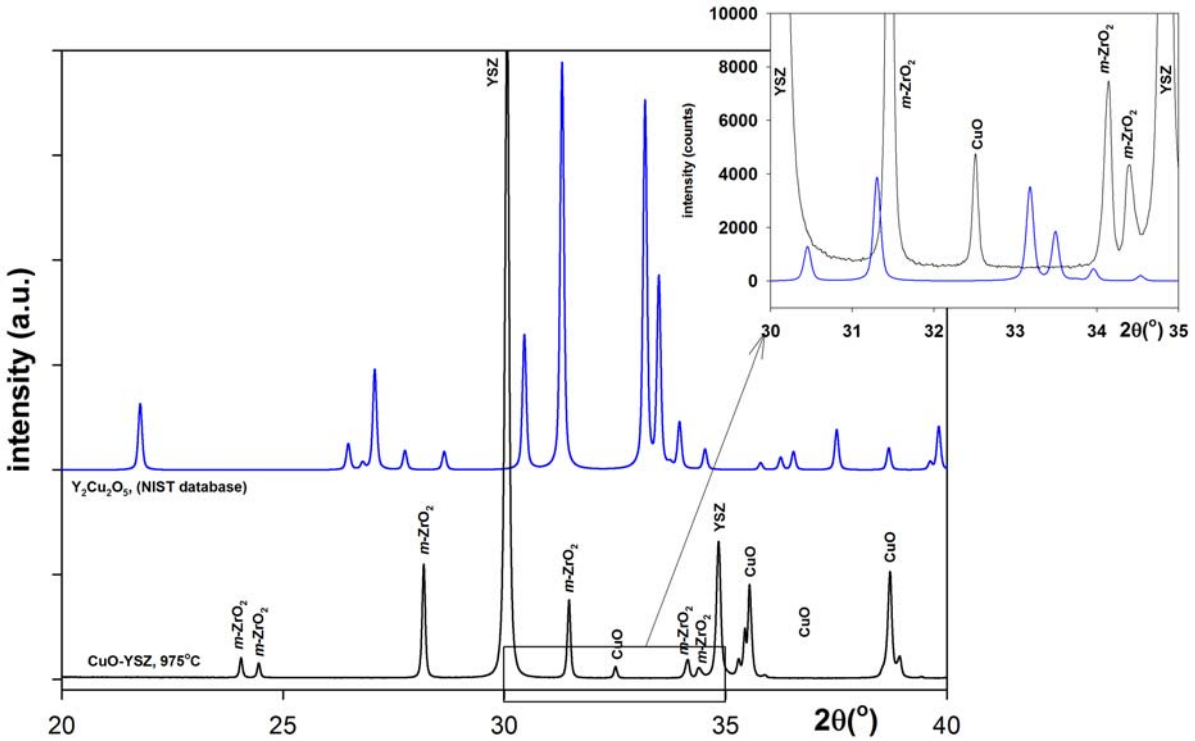

Figure 3 Experimental XRD pattern (11 hours) for a composite YSZ-CuO (1:1 weight), after firing in air, at 975°C for 3h, together with the pattern for the $Y_2Cu_2O_5$ obtained from the ICSD database. It was not possible to find any of the peaks from $Y_2Cu_2O_5$ in the experimental run. This was confirmed by an examination of the 32.5-34 2θ range, where no overlapped peaks from YSZ-CuO are expected. In this range, some peaks with high intensity from $Y_2Cu_2O_5$ would appear if this phase was present; however the inset did not show any extra peaks in that range

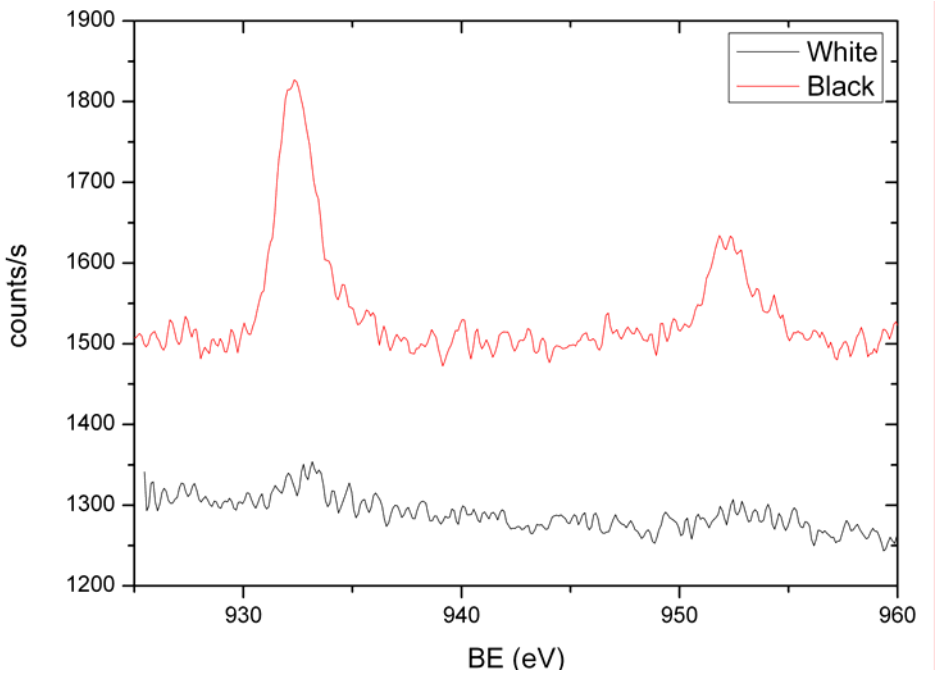

Figure 4 XPS spectra of Cu2p core level electron of bulk YSZ (**grey line**: white zone in YSZ sample; **red line**: dark zone in Cu-YSZ interface).

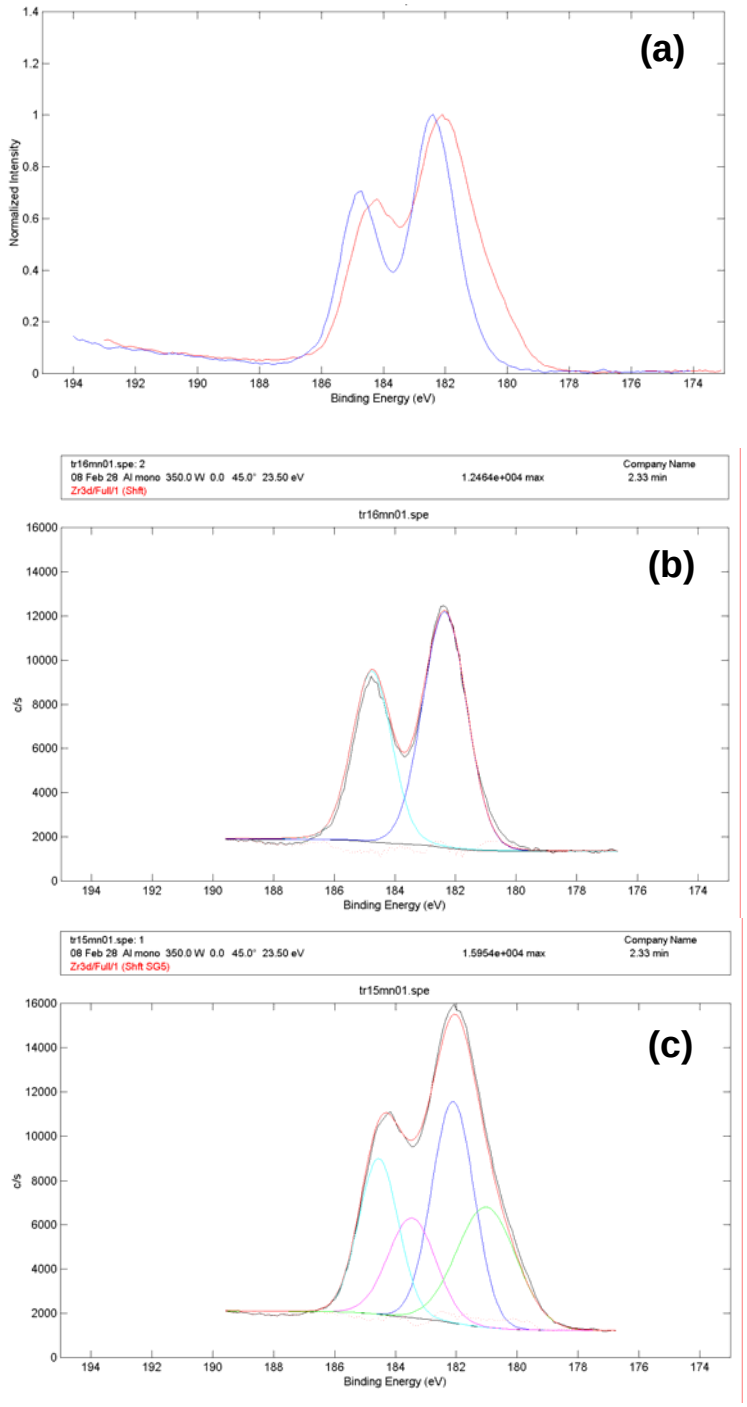

Figure 5 (a) Zr3d XPS spectra of a YSZ dense pellet (sample no reduced -blue line-) and (sample reduced -red line-). The observed shoulder together with the use of four peaks **(c)** instead of two **(b)** to properly fit the spectra indicate the presence of Zr(III).