

Supporting Information

On the O₂ "Surfactant" Effect During Ag/SiO₂ Magnetron Sputtering Deposition: the Point of View of *In situ* and Real-time Measurements

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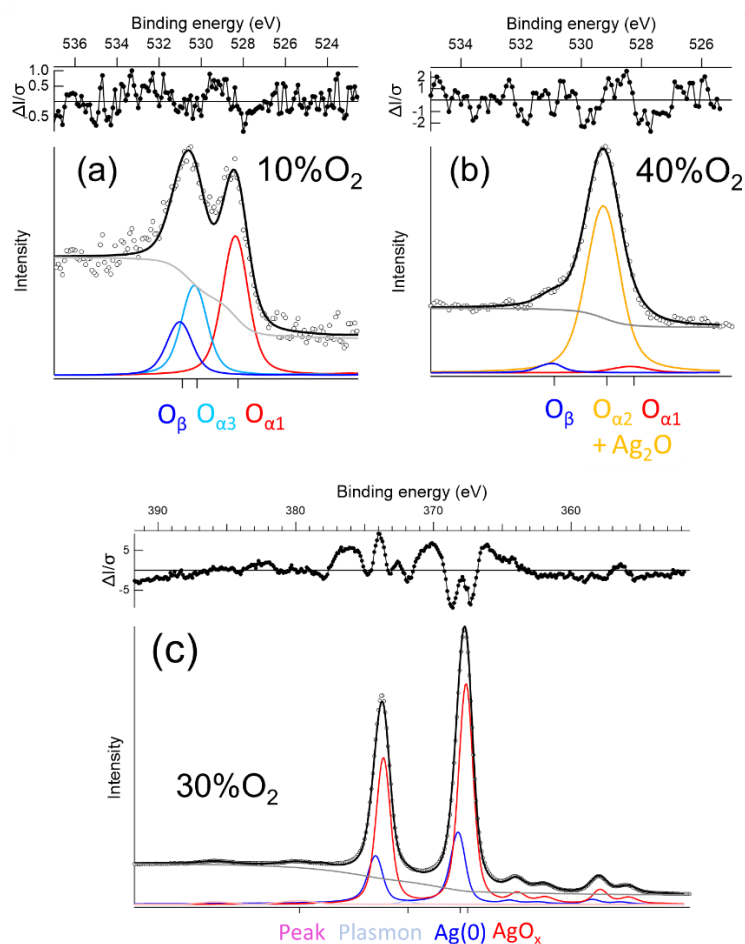


Figure S1: Examples of fits of core level peaks of 20 nm thick films grown under different %O₂: (a) O 1s (10%O₂), (b) O 1s (40% O₂), (c) Ag 3d (30%O₂). See text for explanation. Data (circles), fit (black line), background (grey line) and various components (colored lines as indicated below) are shown. The residuals normalized to error bars taken as the square-root of intensity are shown in the top scale.

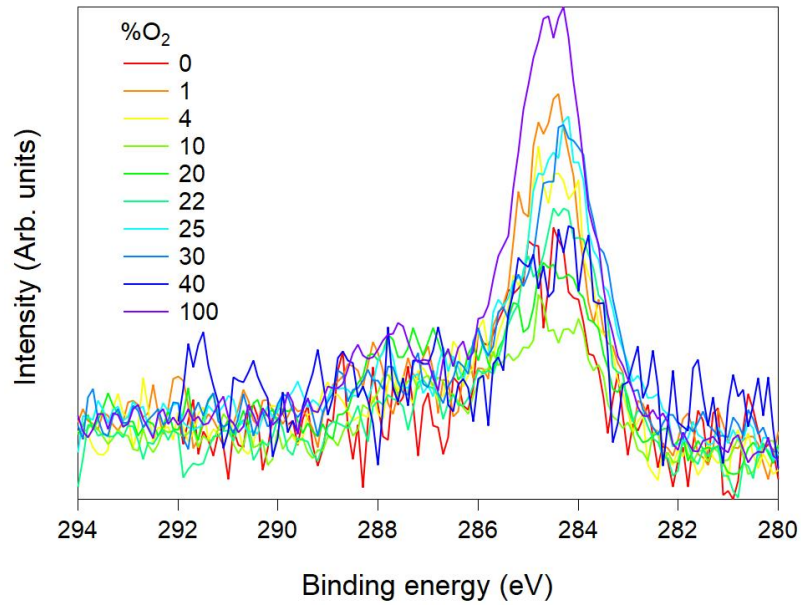


Figure S2: C 1s core level region of a 20 nm thick Ag film grown under %O₂ flow. Notice the presence of only aliphatic carbon contamination ($E_B = 284.5$ eV) and the absence of carbonates ($E_B = 287.6-288$ eV).

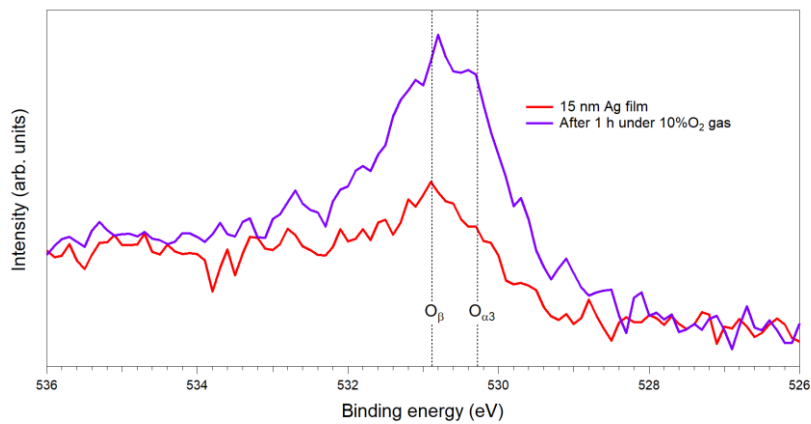


Figure S3: Exposure to molecular O₂ (10%O₂ without plasma) of a 15 nm thick Ag grown under pure Ar. Notice the uptake of O_{α3} et O_β species.

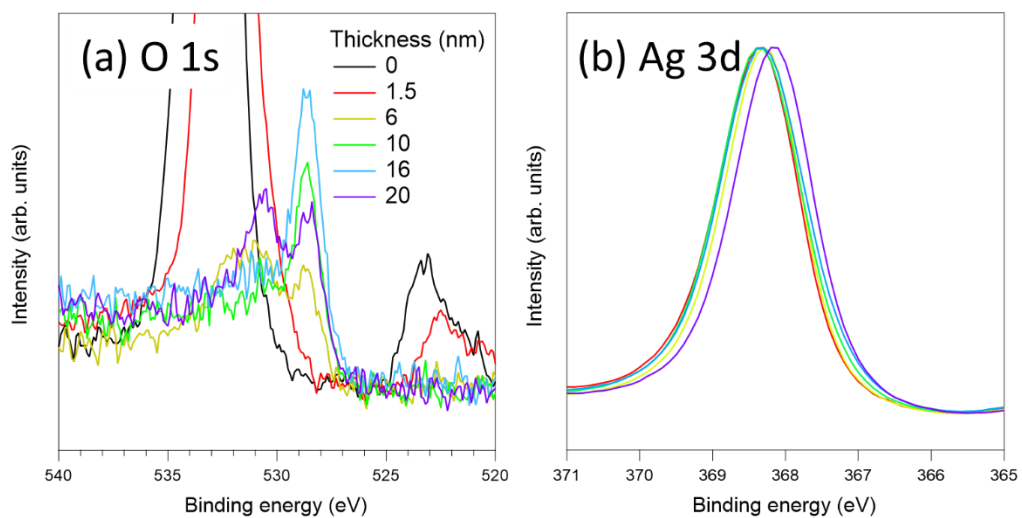


Figure S4: Evolution of (a) O 1s and (b) Ag 3d 5/2 core levels with deposited thickness at 10%O₂.

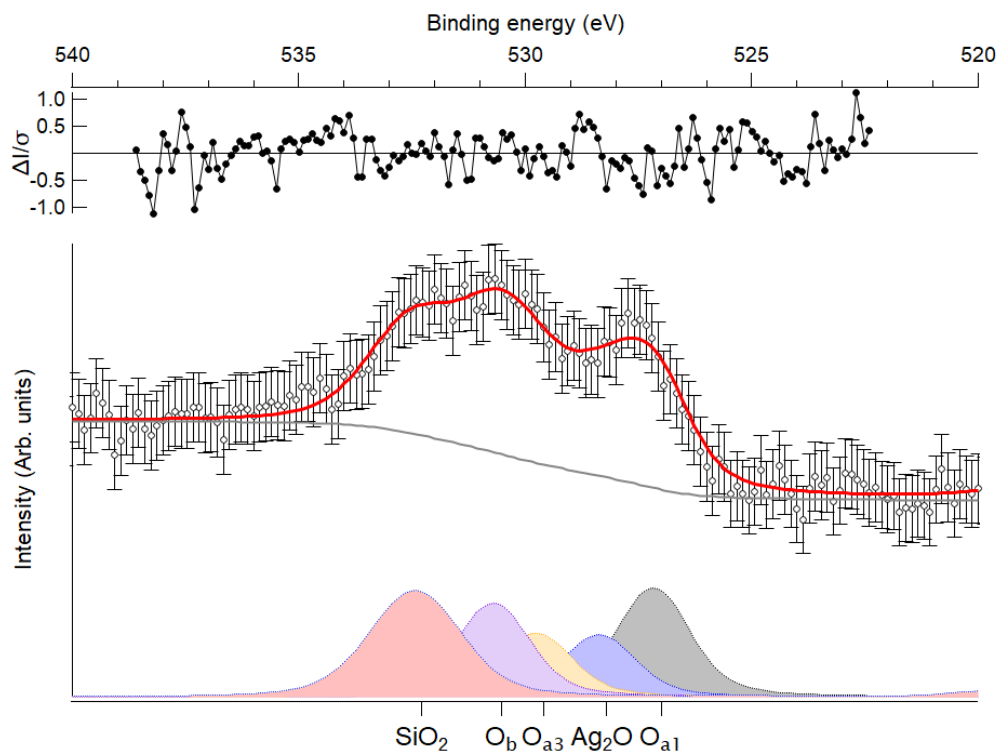


Figure S5: Example of O 1s core level decomposition of a 6 nm thick Ag film grown under 10%O₂ including the signal from the SiO₂ substrate.

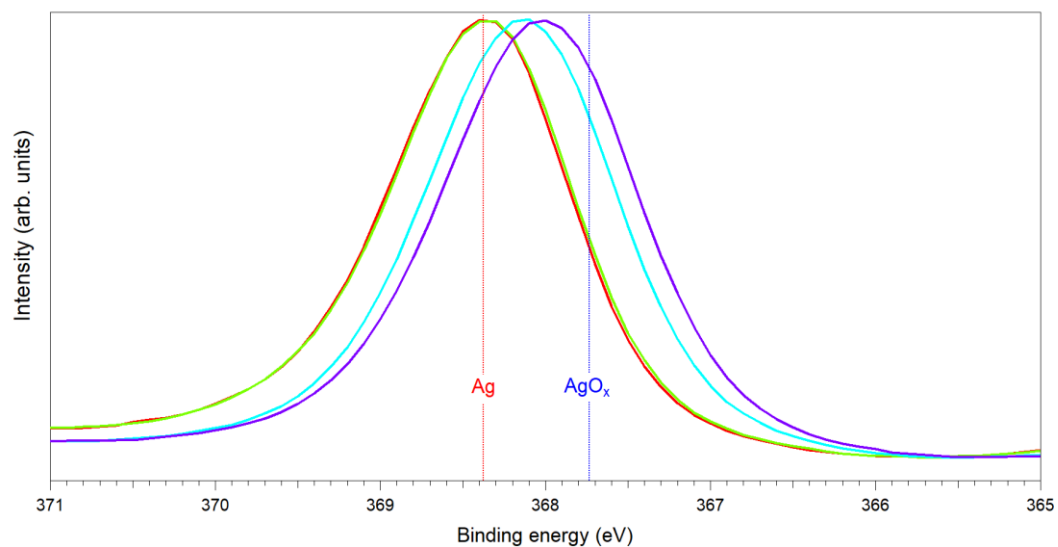


Figure S6: Evolution of Ag 3d core level of a 1.5 nm thick Ag film deposited under pure Ar (red line) induced by a 90 s exposure (i) to molecular O₂ (green line) and (ii) to a plasma generated on a nearby alumina target with 4%O₂ (violet line) and 20%O₂ (blue line). Metallic and oxidized silver binding energies are indicated by vertical lines.

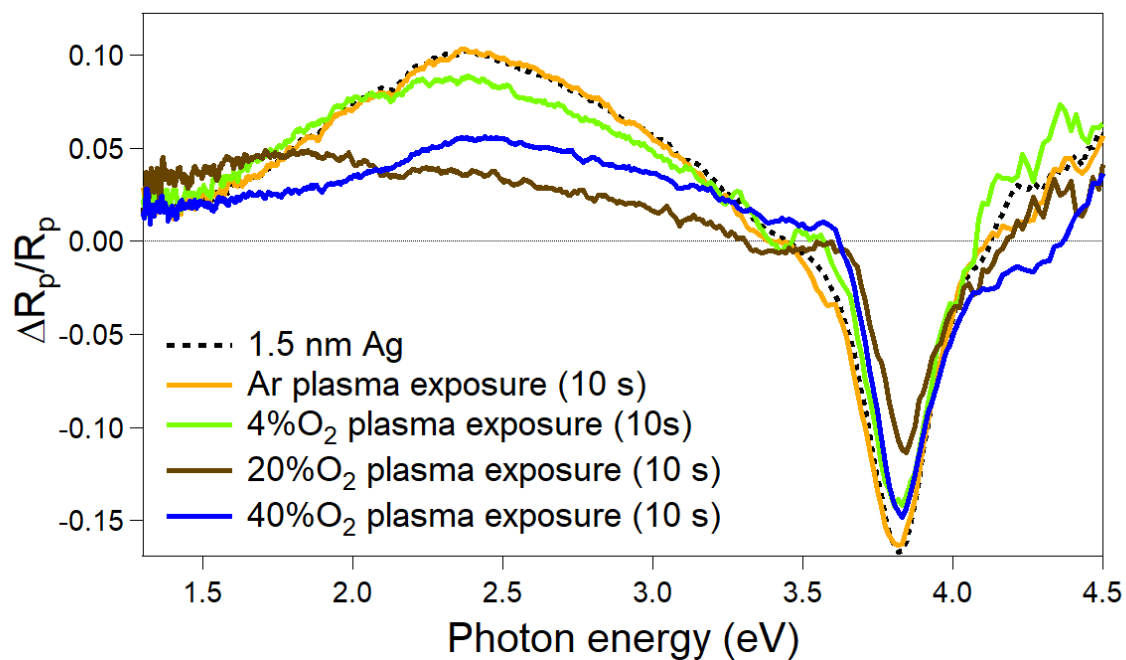


Figure S7: SDRS evolution after a 10 s exposure to plasma of (i) pure Ar i.e. 0%O₂ (orange line) and (ii) 4%O₂, 20%O₂ and 40%O₂ (green, brown, blue lines, respectively) of a 1.5 nm thick Ag film deposited under pure Ar (black dotted line)

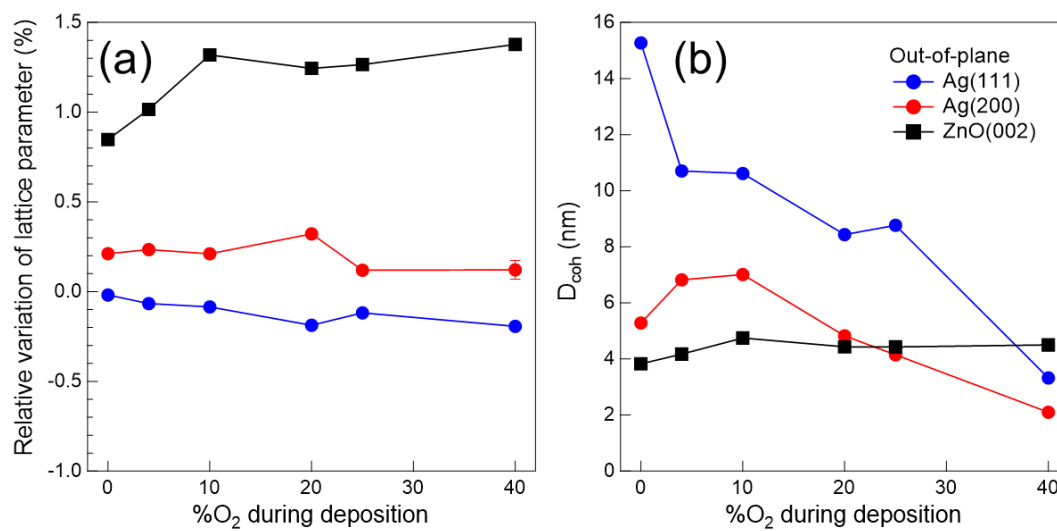


Figure S8: Analysis of XRD data: (a) Strain $\epsilon = \frac{\Delta a}{a_B}$ as given by the variation of lattice parameter relative to bulk value

($\epsilon = \frac{\Delta c}{c_B}$ for (002)_{ZnO} reflection); (b) Debye-Scherrer coherent domain size $D_{coh} = \frac{0.9\lambda}{\cos(2\theta) \Delta(2\theta)}$ with λ the X-ray wavelength and $\Delta(2\theta)$ the FWHM of the reflection

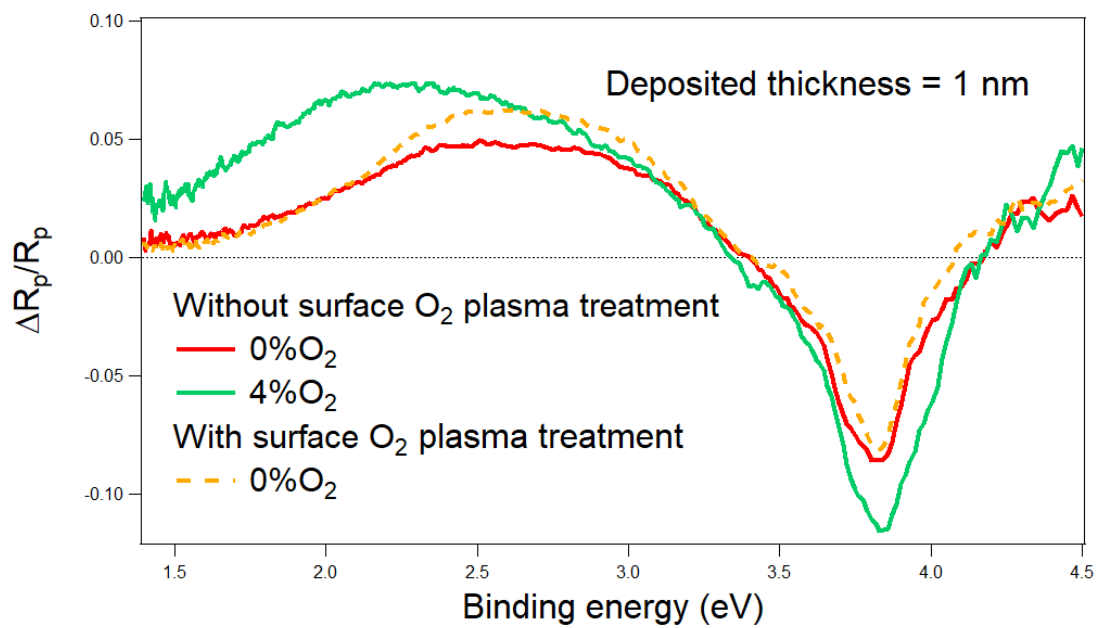


Figure S9: Comparison of *p*-polarized SDRS spectra for 1 nm thick films deposited under (i) pure Ar (0%O₂) without (red line) and with (orange dotted line) substrate plasma pre-treatment at 40%O₂ and (ii) under a gas mixture with 4%O₂.