

Annex I - Additional Material

Glass Characterization

Specific Surface Area (S_{BET})

The specific surface area of the glass powders was evaluated by the physical adsorption of nitrogen gas using the Brunauer-Emmett-Teller (BET) method (Micromeritics Gemini 2370V5). Before performing the experiments, the powders were heated at 200°C for 4h, and 50 points for each adsorption isotherm curve were taken for the calculations.

Thermal Analysis (DTA/TGA)

Differential thermal analysis (DTA) and thermogravimetric analysis (TGA) were performed on a Labsys™TG-DSC16 equipment with a heating rate of 10 °C min⁻¹, from room temperature to 900 °C. It was performed in order to evaluate the relevant temperatures and endothermic and exothermic events in the synthesized powders.

X-Ray Diffraction (XRD)

The presence or absence of the crystalline phases in the samples of the powders was evaluated by XRD. A Rigaku Geigerflex D/Max-Series C diffractometer operating with Cu - K α radiation ($\lambda = 0.15418$ nm) and a filter system with a curved graphite monochromator was used. The diffraction patterns were obtained in the 2 θ range from 10° to 80° with a Step Size of 0.02° every 0.6 s and Generator Settings of 40 mA and 45 kV.

FTIR

Structural features of the glasses were investigated by Fourier transform infrared spectroscopy (FTIR) (Spectrometer Mattson 7000 Series). The measurements were carried out over the wavenumber range of 4000 to 400 cm⁻¹ with a resolution of 2 cm⁻¹ and the scan used was 128. The powders were mixed with KBr (1% w/w) and pressed into thin pellets. Alternatively, the spectra were recorded using an ATR-Golden Gate accessory, operating in reflectance mode with a resolution of 2 cm⁻¹, using a Bruker Tensor 27 FTIR spectrometer. In order to verify the presence of nitrate ions in glasses A1 and A2, after the heat treatment, the samples were subsequently submitted to an acid chemical treatment with an HCl 1.0 mol.L⁻¹ solution, where the powders were put in contact with the solution for 30 mins and then analyzed by FTIR.

Raman spectroscopy

The Raman spectra of the samples were obtained using an FT Raman Bruker RFS/100 spectrometer operating with a 2 cm⁻¹ resolution and 250 scans, from 4000 to 100 cm⁻¹ and 350 mW power laser.

