Supplementary material (ESI) for Journal of Materials Chemistry

A molecular Mg(II) single source precursor for MgO. Synthesis and characterisation of MgO nanoparticles, MgO thin films and polycrystalline MgO nanorods.

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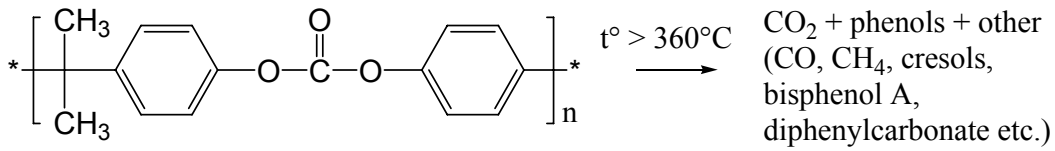
Supplementary information

Complete discussion of the gaseous decomposition products from polycarbonate membrane:

The scheme of decomposition can be summarily expressed as follows:



The release of gaseous products from Whatman Nuclepore™ templates and the corresponding sharp increase of ionic currents was detected via mass-spectrometry in the temperature interval between 400 and 600 °C.

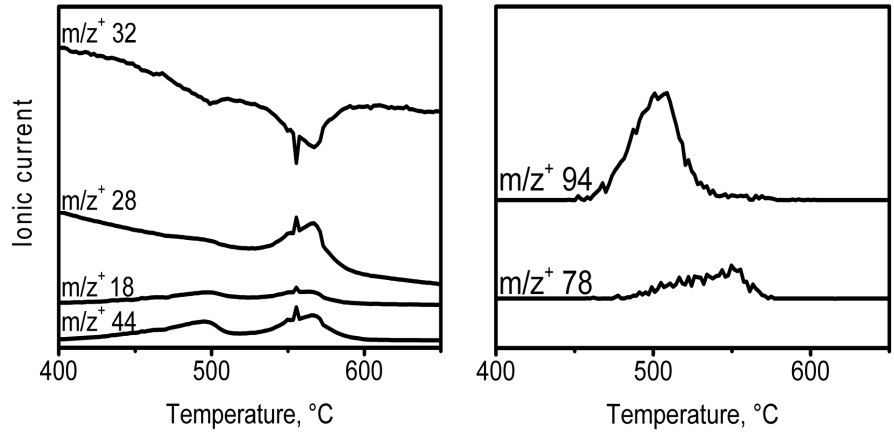


Figure 1: Qualitative MS curves of the commercial polymeric porous membranes analysed in oxidizing atmosphere.

First, water (H_2O, m/z^+ 18) and carbon dioxide (CO_2, m/z^+ 44) is released, presumably, not only from decomposed polymer but also including gas and moisture adsorbed in the pores. Some decrease of the ionic current corresponding to oxygen (O_2, m/z^+ 32) is observed, as it is consumed during oxidative processes. The further reaction is accompanied by the significant release of carbon monoxide (CO, m/z^+ 28), and detectable amounts of benzene (C_6H_6, m/z^+ 78) and phenol (C_6H_5OH, m/z^+ 94).

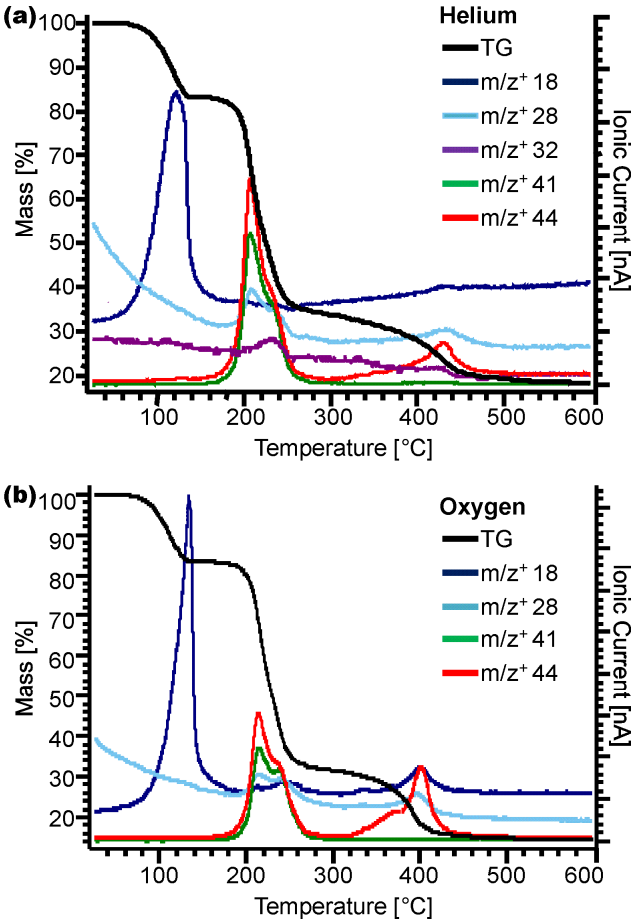


Figure 2: TG-coupled MS of Tris(aquo)-bis[2-(methoxyimino)propanato]magnesium in (a) helium and (b) oxygen atmosphere.

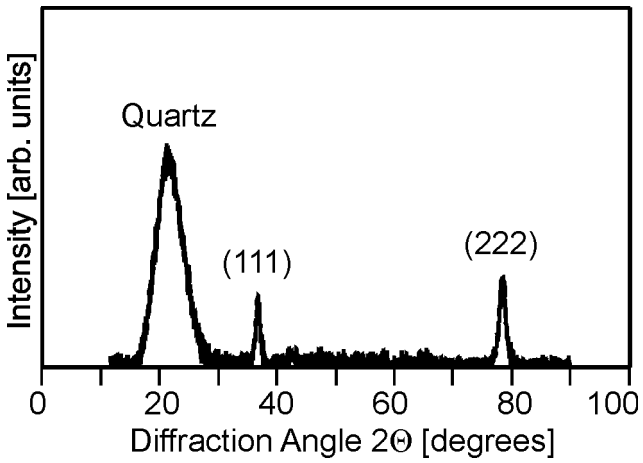


Figure 3: Grazing incidence XRD (*including automated background subtraction*) of MgO film on quartz (thickness about 270 nm) obtained by repeated spincoating of 12 layers on quartz and annealing at 210°C, followed by calcination at 450°C.

Background subtraction was carried out using the routine provided by the program Match!, version 1.9d from Crystal Impact.

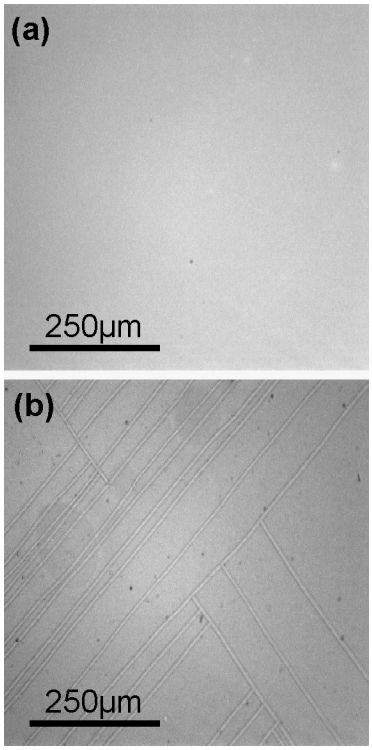


Figure 4: Optical micographs of MgO film on quartz (thickness about 110 nm) obtained by repeated spincoating of 5 layers on quartz and annealing at 210°C, followed by calcination at 450°C; (a) cooling rate > 10 K/h (furnace characteristic); (b) quenching to room temperature.

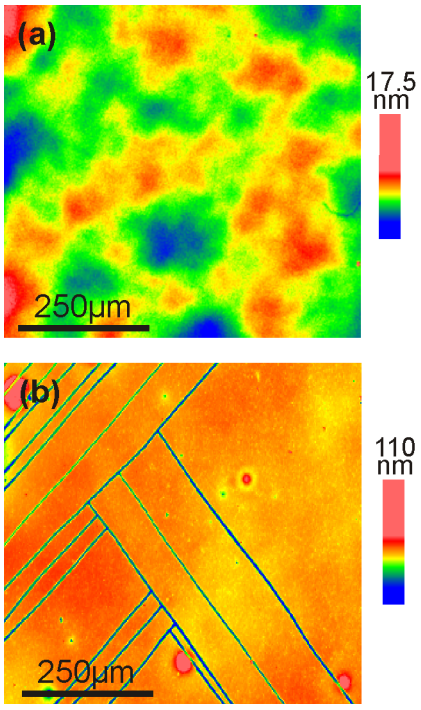


Figure 5: Images from optical profilometry corresponding to samples in Figure 4.

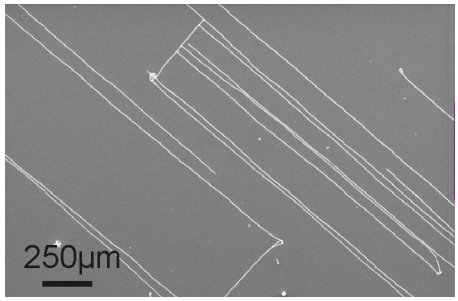


Figure 6: SEM image of MgO film on quartz (thickness about 110 nm) obtained by repeated spincoating of 5 layers on quartz and annealing at 210°C, followed by calcination at 450°C. Break lines obtained by quenching to room temperature.

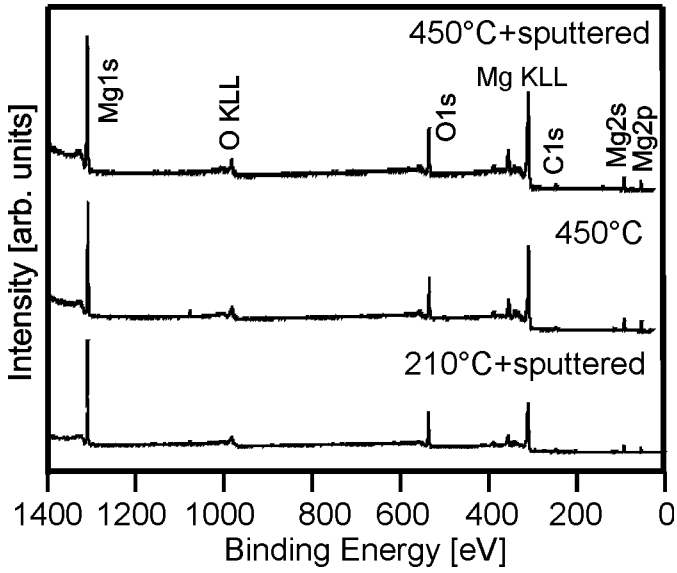


Figure 7: XPS survey spectra of MgO films after calcination at different temperatures for 1 hour. Samples treated with additional argon sputtering in the vacuum chamber are mentioned in the figure.

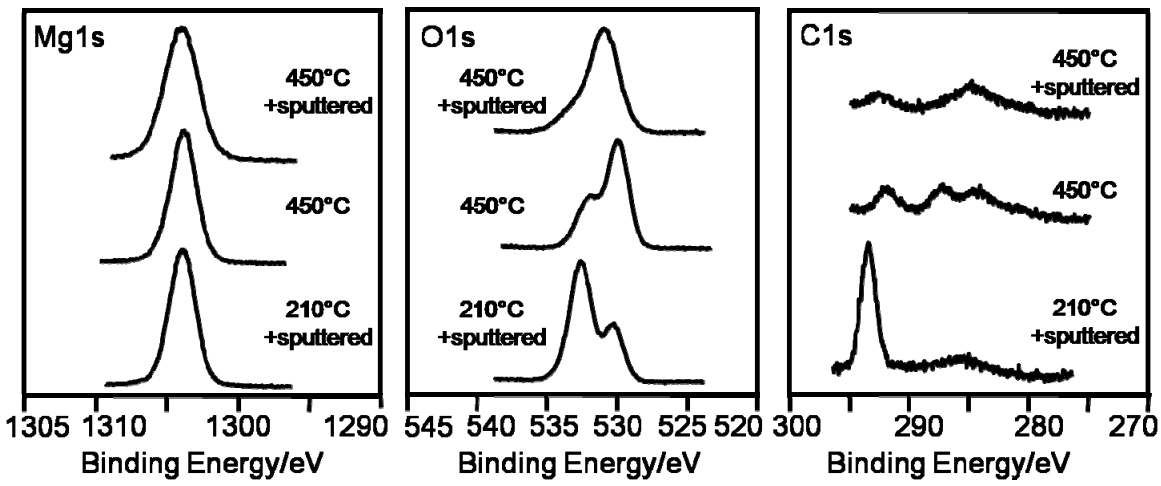


Figure 8: XPS spectra of Mg 1s, O 1s and C 1s signals of films after calcination at different temperatures for 1 hour. Samples treated with additional argon sputtering in the vacuum chamber are mentioned in the legend.