

Figure 1: Schematic representation of the different dosing sequences used for the deposition of aluminium phenylphosphonate (AlPhPO) films based on our proposed reaction chemistry.

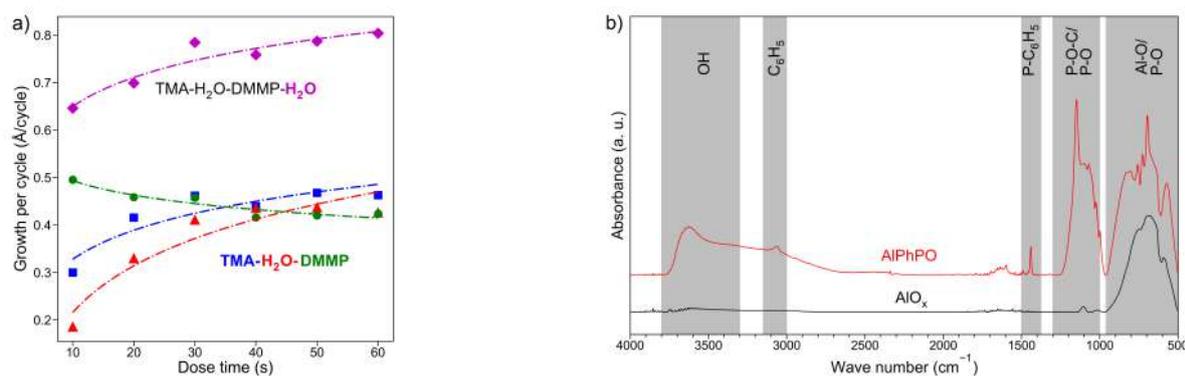


Figure 2: (a) Saturation curves for the three- and four-step deposition schemes at 250 °C. Both dosing sequences are observed to saturate, but the saturated growth is lower for the three-step sequence than with the four-step process. (b) FTIR spectra of AlPhPO films deposited at 250 °C. The features at 3050  $\text{cm}^{-1}$ , 1450  $\text{cm}^{-1}$  and the broad feature from 1000-1275  $\text{cm}^{-1}$  indicate the incorporation of the aryl phosphonate species in the MLD film.

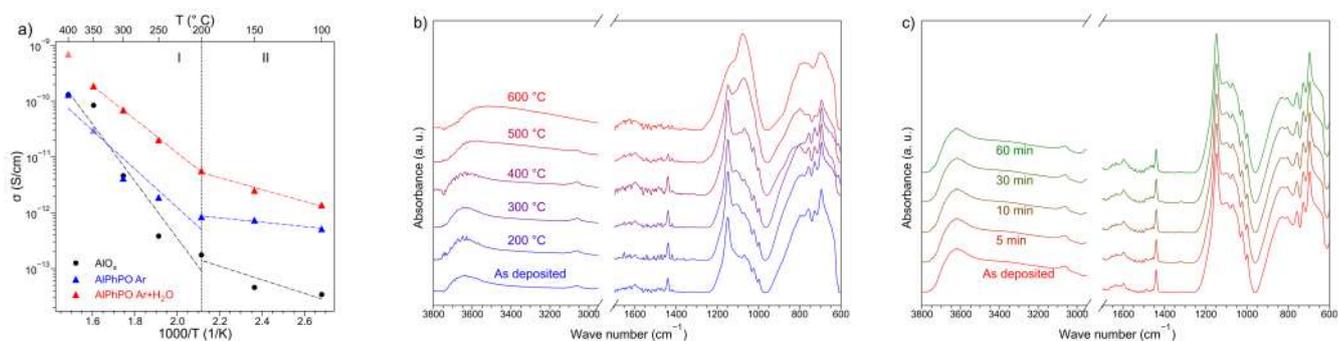


Figure 3: (a) Transverse ionic conductivity for the as-deposited phosphonate thin-film measured with varying temperature and gaseous environment compared with the conductivity of alumina. (b) Thermal stability measurements: film annealed in air in increments of 100 °C with FTIR measurements in between. The films are stable after annealing to 500 °C, after which the film is converted to aluminium phosphate. (c) Water stability measurements: film immersed in water for varying intervals of time with FTIR measurements in between. The films are observed to be stable for 1 hour of immersion.