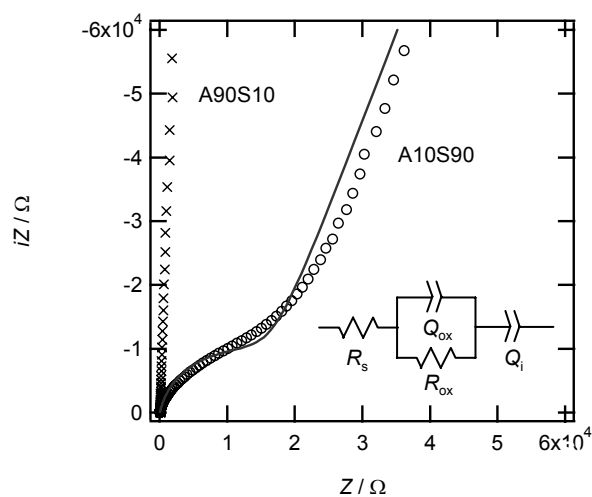


**Figure S1** SEM images of (a) surface and (b) cross-section of A10S90 film. The specimens for SEM observation were sputter-coated by Pt particle.



**Figure S2** Complex impedance spectra of the amorphous A10S90 (○) and A90S10 (×) films prepared on ITO substrate and equivalent circuit for the ion-conductive A10S90 film. A solid curve indicates the plots calculated for A10S90 by nonlinear-least-squares-fitting calculation based on the equivalent circuit.  $R$  is resistance and  $Q$  a constant phase element that is a kind of capacitance,  $C$ , and given by  $(1/C)^{-n}$ .