Electronic Supplementary Information (ESI)

Systematic study of ionic conduction in silver iodide / mesoporous alumina composites 1: Effect of pore size and filling level

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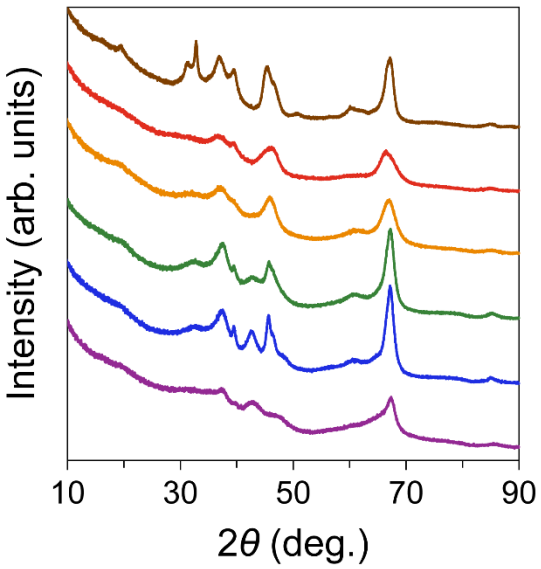

Fig. S1 PXRD pattern of MPAs (brown: MPA1, red: MPA2, orange: MPA3, green: MPA4, blue: MPA5, purple: MPA6) after heat treatment.

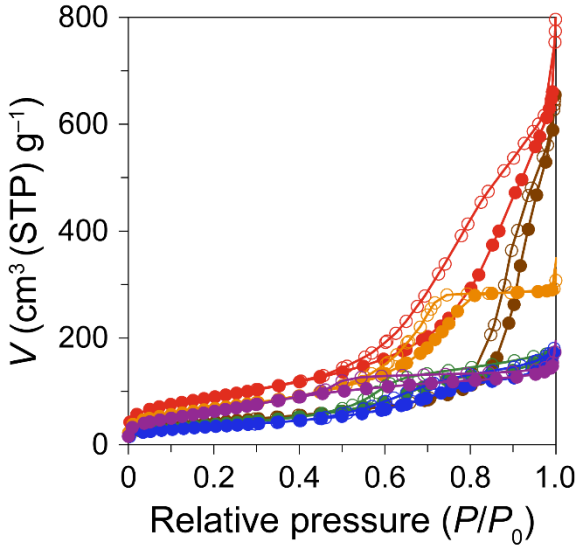

Fig. S2 N_2 gas adsorption (closed symbols) and desorption (open symbols) isotherms at 77 K (brown: MPA1, red: MPA2, orange: MPA3, green: MPA4, blue: MPA5, purple: MPA6).

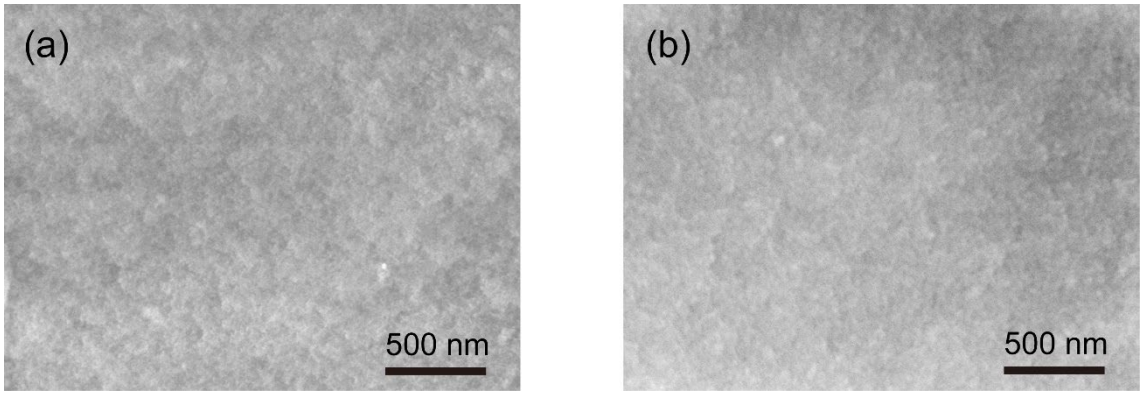

Fig. S3 SEM images of AgI/MPA3 composites (a) before and (b) after heat treatment at 600 °C for 20 h.

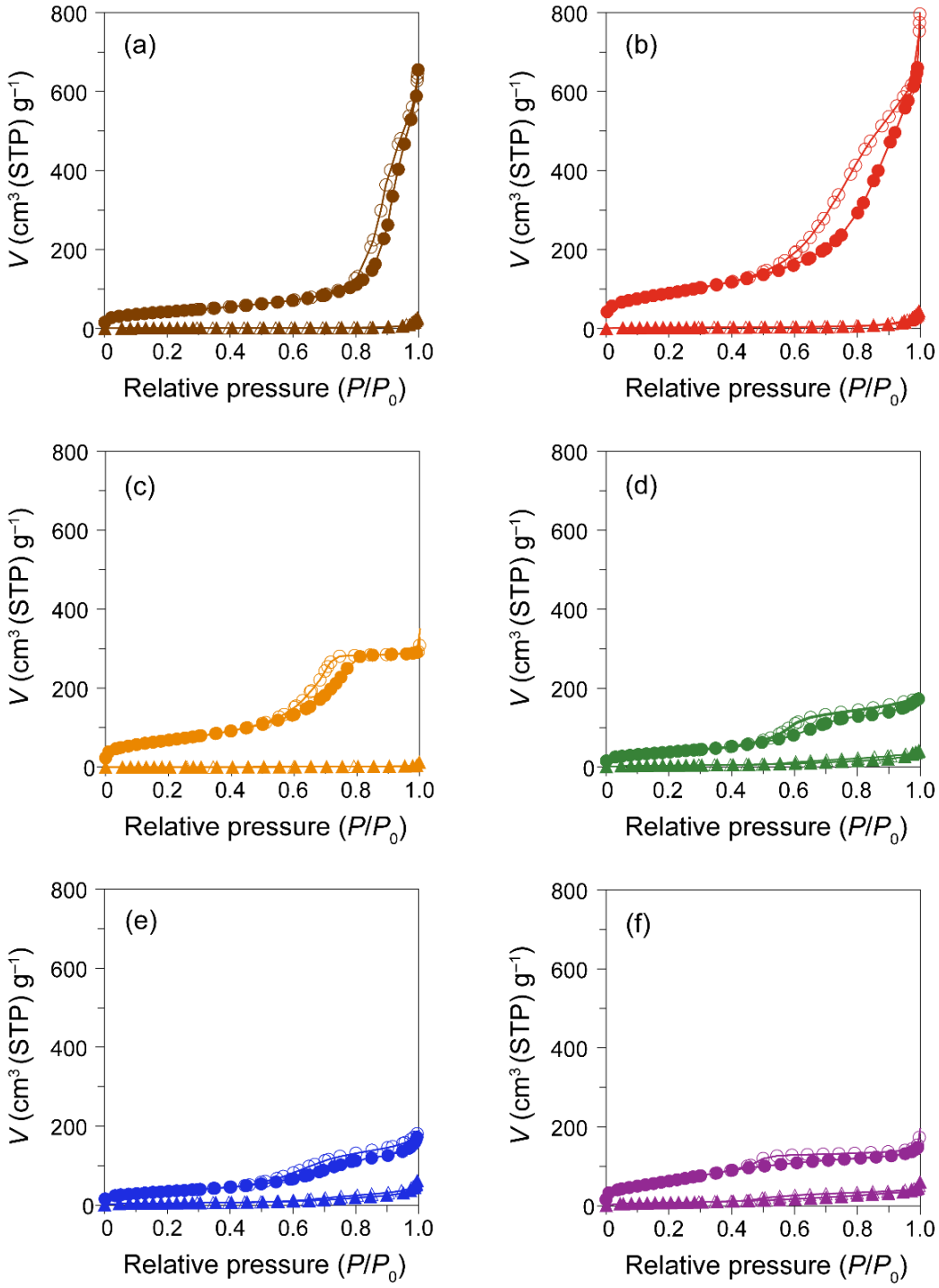

Fig. S4 N_2 gas adsorption (closed symbols) and desorption (open symbols) isotherms of parent MPAs (circles) and the AgI-loaded composites with the volumetric filling factor of approximately 90% (triangles) for (a) MPA1, (b) MPA2, (c) MPA3, (d) MPA4, (e) MPA5, and (f) MPA6 at 77 K.

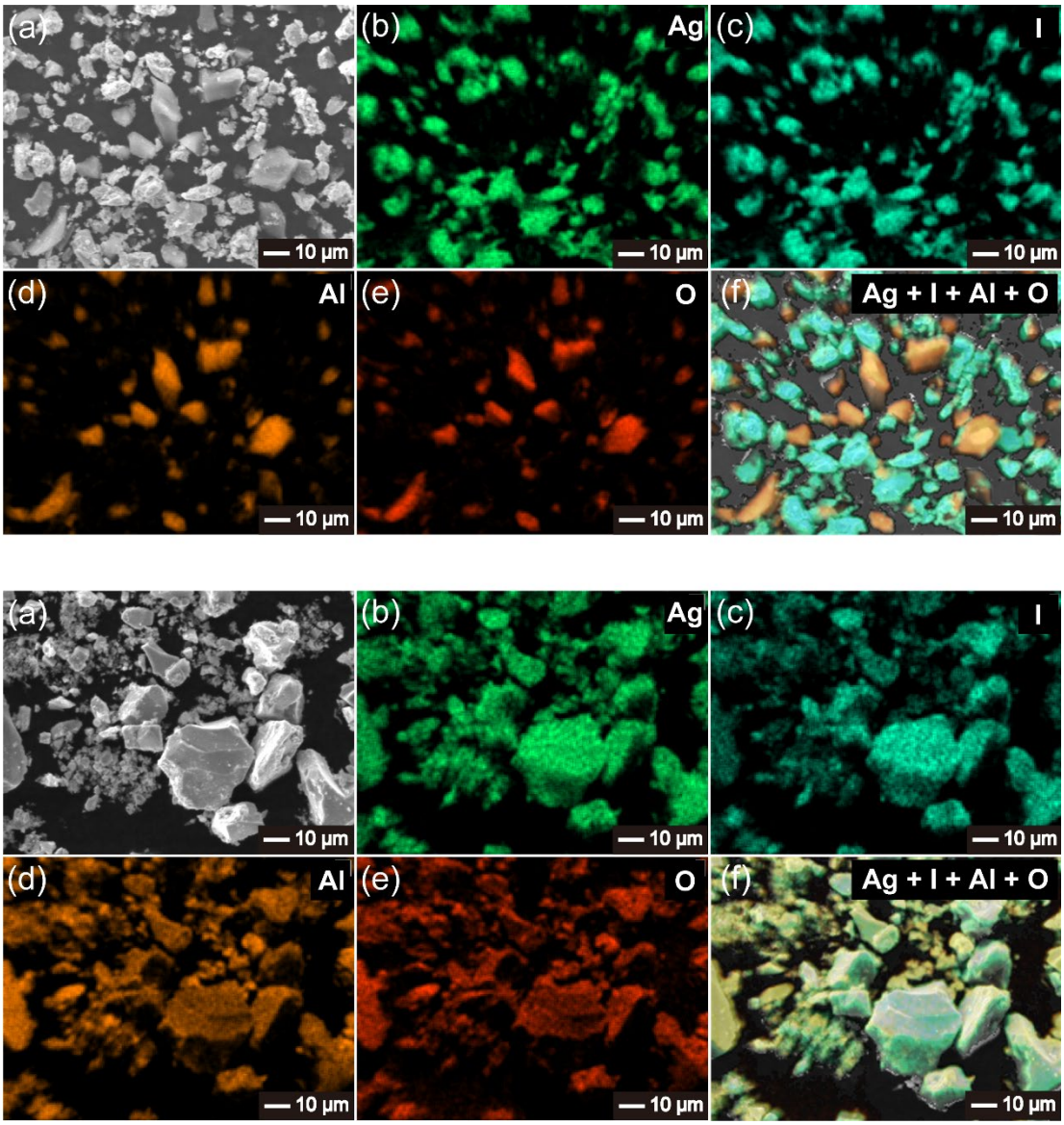

Fig. S5 (a) SEM image and EDS mappings ((b) silver, (c) iodine, (d) aluminum, (e) oxygen, and (f) superposition of four elements) of AgI/MPA3 composites (top) before and (bottom) after heat treatment.

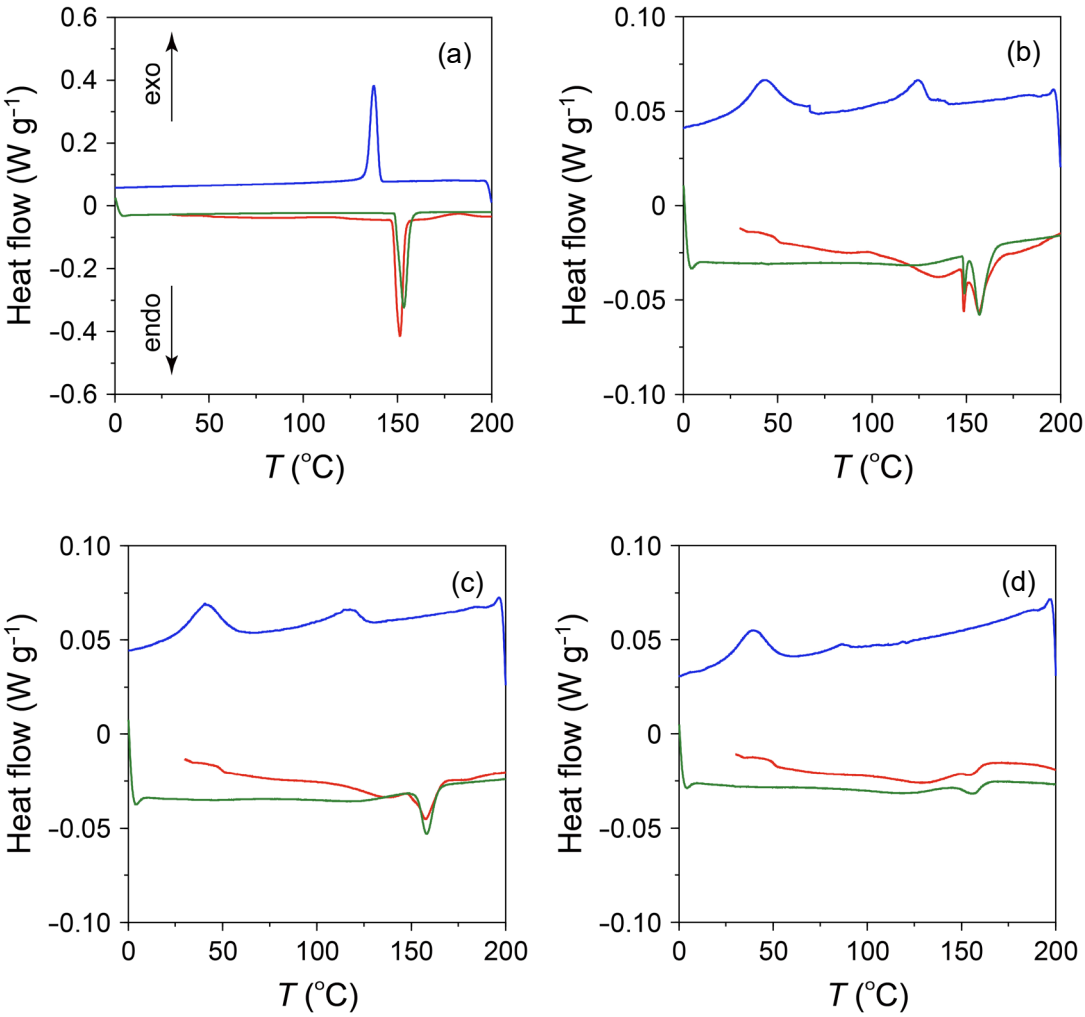

Fig. S6 DSC profiles of AgI/MPA3 composites before heat treatment (a) and after heat treatment at (b) 400 °C, (c) 500 °C, and (d) 600 °C (red: 1st heating process, blue: 1st cooling process, green: 2nd heating process).

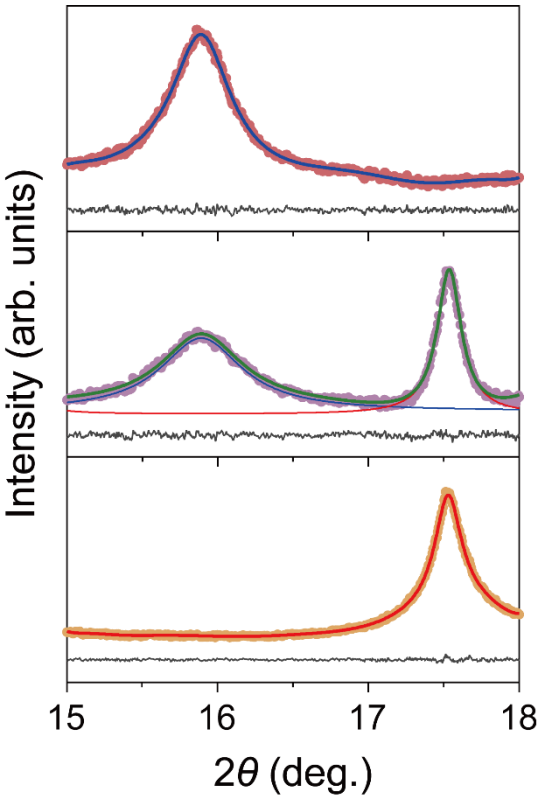

Fig. S7 Synchrotron PXRD patterns of AgI/MPA3 composite at 25, 160, and 190 °C from the bottom in the heating process (λ = 0.699585(1) Å). Experimental profiles (orange, purple, and red circles) were refined by the Rietveld method, where red, blue, and green lines indicate the calculated patterns for β-phase, α-phase, and the sum of the components, respectively. Gray lines indicate the difference between observed and calculated profiles.

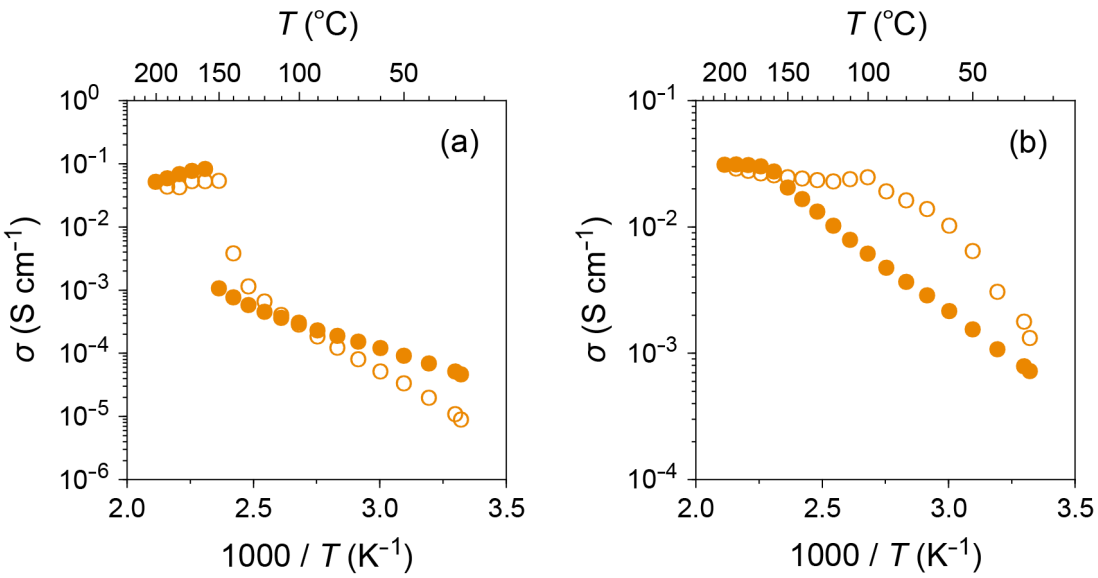

Fig. S8 Temperature dependence of σ for AgI/MPA3 composite (a) before and (b) after heat treatment in heating (closed circles) and cooling (open circles) processes.

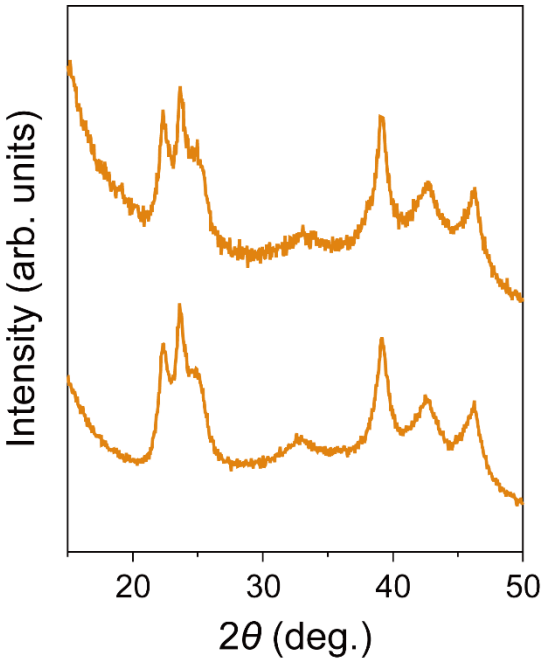

Fig. S9 PXRD patterns of AgI/MPA3 composite before (bottom) and after (top) the electrochemical impedance spectroscopy measurements (25–200 °C).

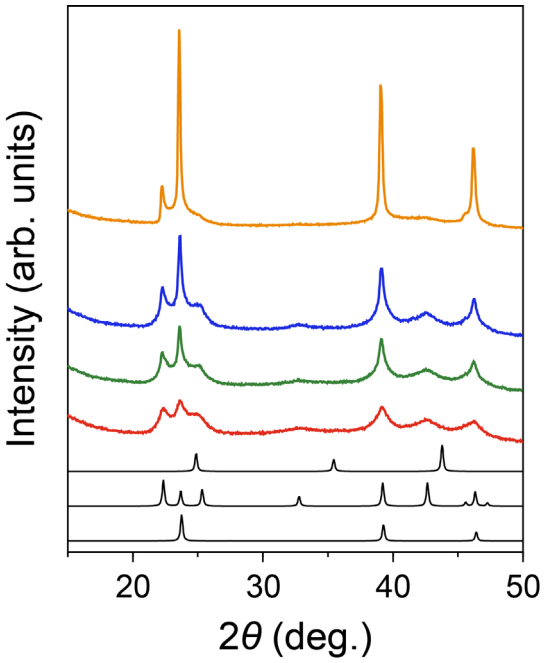

Fig. S10 PXRD patterns of AgI/MPA3 composites (orange: before heat treatment, blue: heat treatment at 400 °C, green: heat treatment at 500 °C, red: heat treatment at 600 °C) along with simulated patterns (black thin lines) of α-, β-, and γ-AgI (from the top).

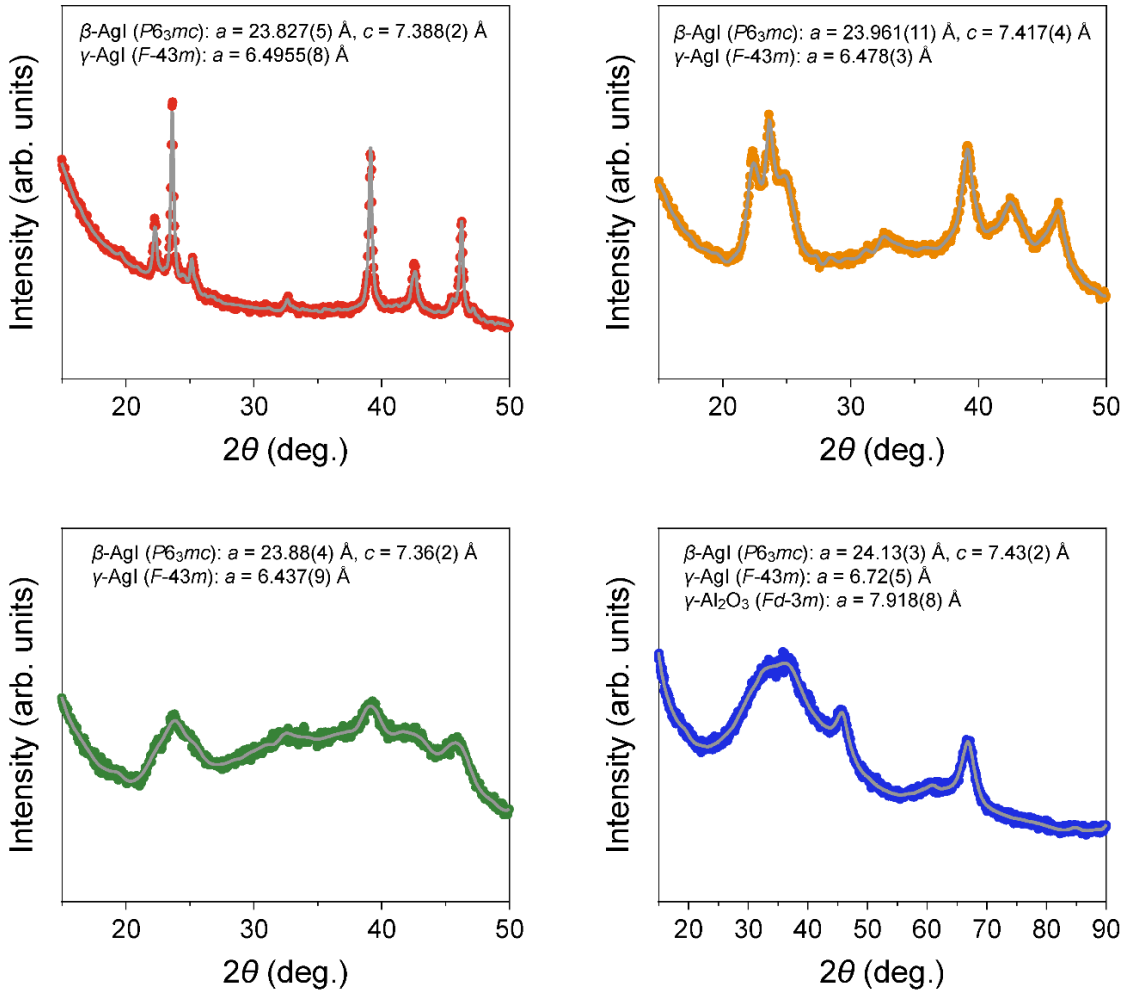

Fig. S11 PXRD patterns of AgI/MPA3 composites (red: AgI/MPA3 = 8:2, orange: AgI/MPA3 = 6:4, green: AgI/MPA3 = 4:6, blue: AgI/MPA3 = 2:8) together with their corresponding patterns using the Le Bail method (solid gray line).

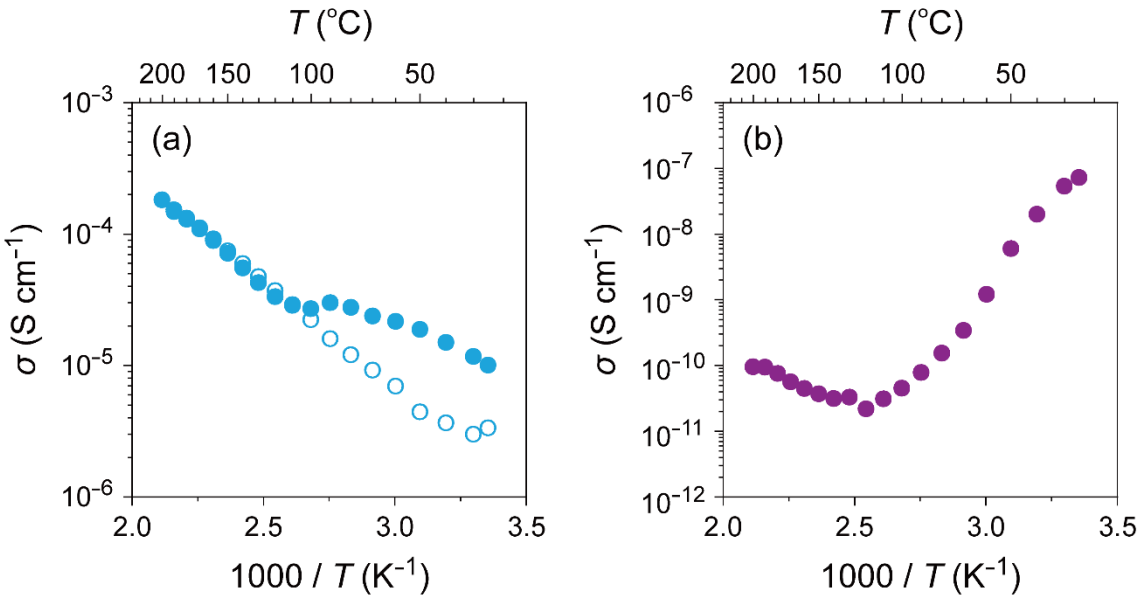

Fig. S12 Temperature dependence of ionic conductivity (σ) of composites with (a) AgI/MPA3 = 3:7 and (b) AgI/MPA3 = 1:9 in the heating (closed circles) and cooling (open circles) processes.

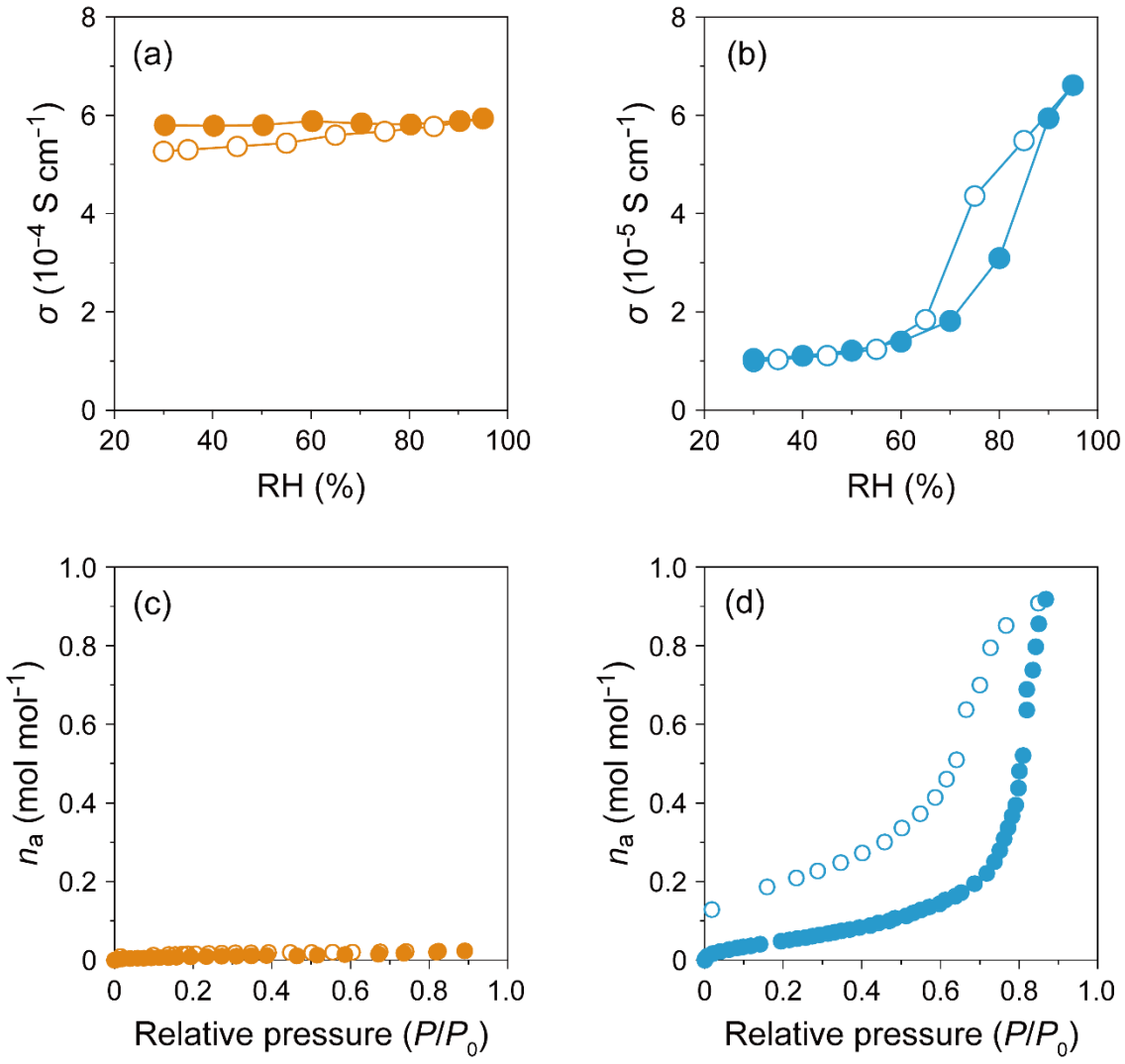

Fig. S13 Humidity dependence of ionic conductivity (σ) of composites with (a) AgI/MPA3 = 6:4 and (b) AgI/MPA3 = 3:7 at 25 °C. Water vapor adsorption (closed circles) and desorption (open circles) isotherms of composites with (c) AgI/MPA3 = 6:4 and (d) AgI/MPA3 = 3:7 at 25 °C. n_a is the molar number of water molecules adsorbed in a mole of MPA3 (formular unit: Al_2O_3).