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Electronic Supporting Information

Aqueous gelation of ionic Liquids: Reverse thermoresponsive ion gels

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Experimental Methods:

Materials:

AMMOENG111 (A111) ionic liquid (IL) (technical purity, 95+%) was purchased from Solvent-Innovation. Sodium bicarbonate ($NaHCO_3$) (>99.5%) was purchased from Sigma-Aldrich. Deionized water was utilized for the preparation of the ion gels (IGs).

Preparation method of the gels:

The IGs were prepared by mixing the corresponding amounts of water and A111 in closed glass vials. In order to accelerate homogenization and to promote the formation of the gels, the samples were slightly heated and stirred manually. Thereafter, the samples were cooled down to room temperature (r.t.) and stabilized overnight to assure the full formation of the gel. In the cases of the incorporation of additional ionic species (inorganic salts), $NaHCO_3$ was first dissolved into water before mixing with A111, followed by the aforementioned procedure.

Characterization techniques:

Rheological measurements were performed using a Physica rheometer (Anton Paar) utilizing a MCR301 cell and coupled with CTD450 device to control the temperature by means of liquid nitrogen for cooling and a convection oven (with nitrogen gas) for heating. A parallel-plate measuring system (25 mm in diameter) was used. Temperature sweep test were performed at 2% strain and 1 rad·s^{-1} from –20 to 80 ºC at a heating rate of 2 ºC min^{-1}.

Ionic conductivity (σ) measurements were carried out by a commercial conductimeter, Cond 730 series (inoLab WTW), using a TretraCon 325 sensor which includes a temperature sensor. The conductimeter was adjusted to zero in the air and followed by a calibration with a

standard solution of potassium chloride (KCl). For these measurements, the IGs were brought to their corresponding melting point and the sensor was placed into the molten material. Thereafter, the samples were stabilized during 30 min at r.t. before starting the measurements. Temperature range of the analysis was from r.t. to 70 ºC, which was controlled with a water bath at heating rate of 2.5 ºC·min^{-1}.

Thermogravimetric analysis (TGA) of the A111 IL were performed using a Netzsch TG 209 F1 TGA apparatus from 40 to 800 ºC with a heating rate of 5 ºC·min^{-1}.

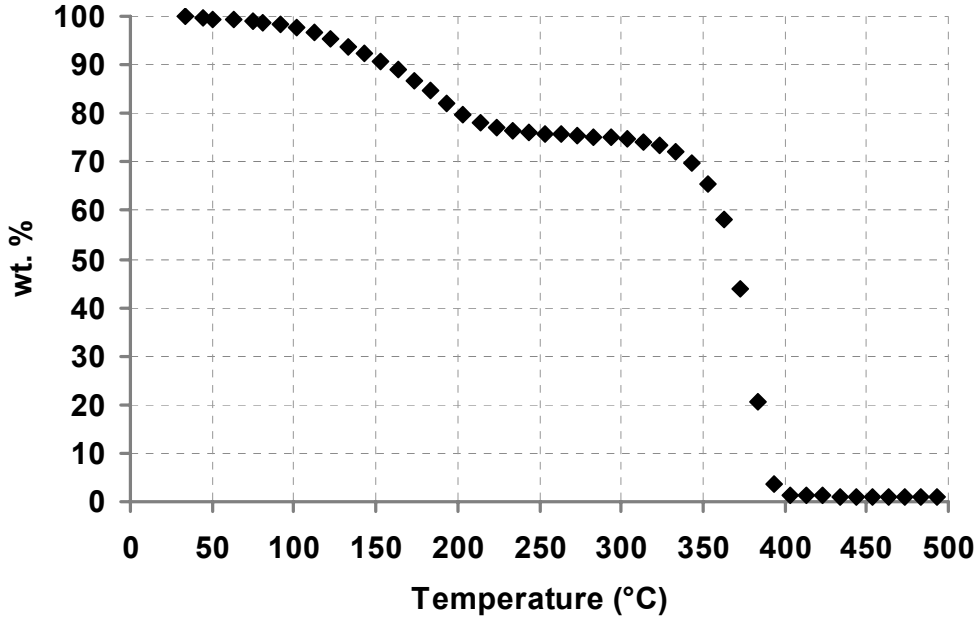

Fig. S1 Thermogravimetrical analysis (TGA) of the A111 IL.

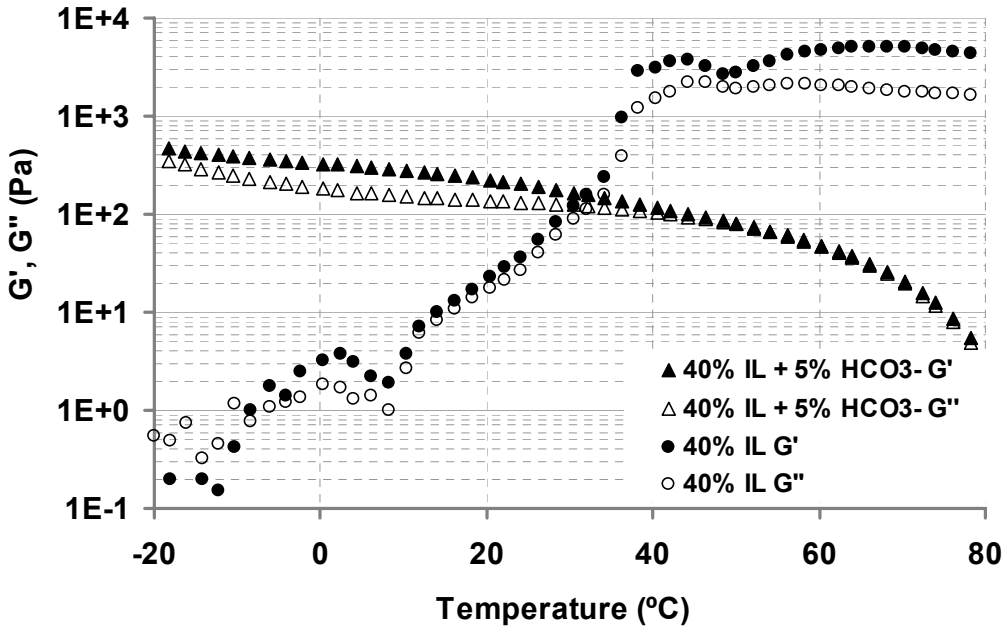

Fig. S2 Rheological properties as a function of temperature for an IG derived from the aqueous gelation of A111 IL and the effect of adding an inorganic salt (sodium bicarbonate).