SUPPORTING INFORMATION

Semi-solid electrodes based on injectable hydrogel electrolytes for shape-conformable batteries

Mario Borlaf[1,2,#], Matias L. Picchio[3,4], Gisela Carina Luque[3], Miryam Criado-Gonzalez[4], Gregorio Guzmán-Gonzalez[4], Daniel Pérez-Antolin[1,2], Gabriele Lingua[4], David Mecerreyes[4,5*], Edgar Ventosa[1,2*]

[1] Universidad de Burgos, Facultad de Ciencias, Dpto. Química Analítica, Plaza de Misael Bañuelos S/N, 09001 Burgos, Spain

[2] International Research Center in Critical Raw Materials for Advanced Industrial Technologies (ICCRAM), Edificio I+D+I/CIBA, Plaza de Misael Bañuelos S/N, 09001 Burgos, Spain

[3] Instituto de Desarrollo Tecnológico para la Industria Química (INTEC), CONICET, Güemes 3450, Santa Fe 3000, Argentina.

[4] POLYMAT University of the Basque Country UPV/EHU, Joxe Mari Korta Center, Avda. Tolosa 72, 20018 Donostia-San Sebastián, Spain

[5] Ikerbasque, Basque Foundation for Science, 48013 Bilbao, Spain.

[#]Present address: Universidad Autónoma de Madrid, Department of Inorganic Chemistry, Francisco Tomás y Valiente 7, 28049 Madrid, Spain.

*Corresponding authors emails: eventosa@ubu.es; david.mecerreyes@ehu.es

Section S1: rheological characterization.

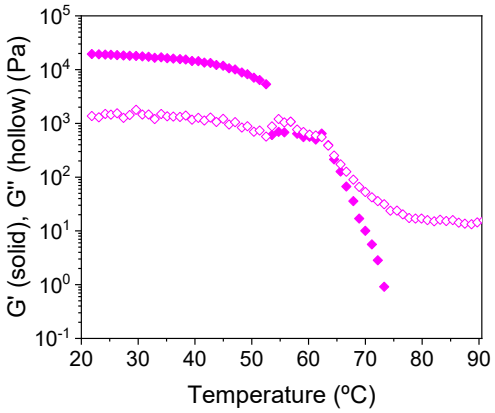

Figure S1. Evolution of the elastic modulus (G') and loss modulus (G'') of G1 gel (without carbon additive) as a function of the temperature.

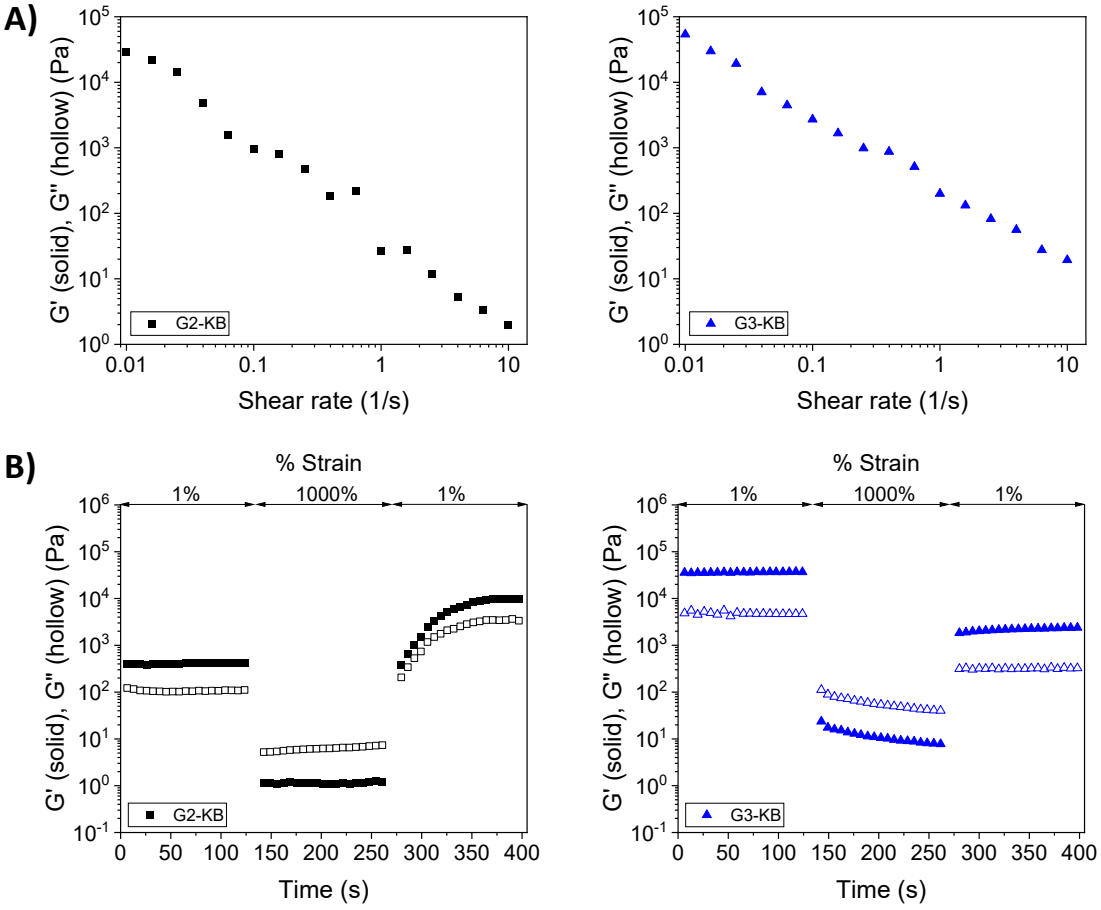

Figure S2. (A) Shear thinning properties of G2-KB and G3-KB gels. (B) Dynamic step strain test of G2-KB and G3-KB gels to determine the injectability properties.

Section S2: photographs of the different gels without carbon additive to evaluate their shrinkage.

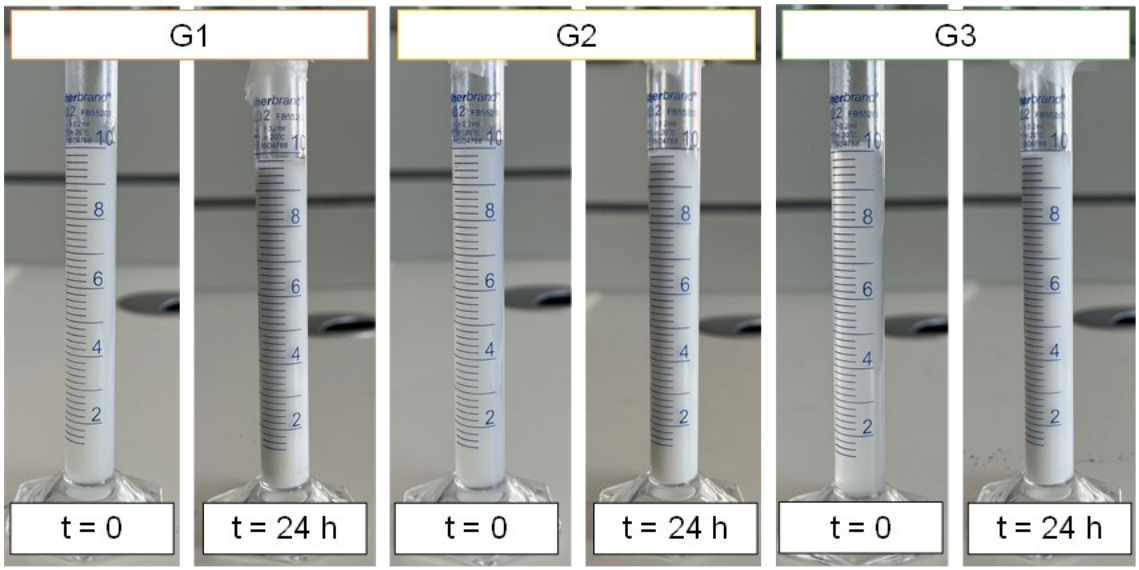

Figure S3. Photographs of the different gels as prepared and after 24 h.

Section S3: electrochemical stability window of the hydrogels.

Figure S4 shows the stability window of the electrolyte: 0 – 1.5 V vs Zn/Zn^{2+} (-0.34 V / 1.21 V vs RHE in neutral pH). The anodic process occurring at 1.5 V is associated with the oxidation of the gelifying additive while the large anodic process at 2.2 V is related with the oxygen evolution reaction

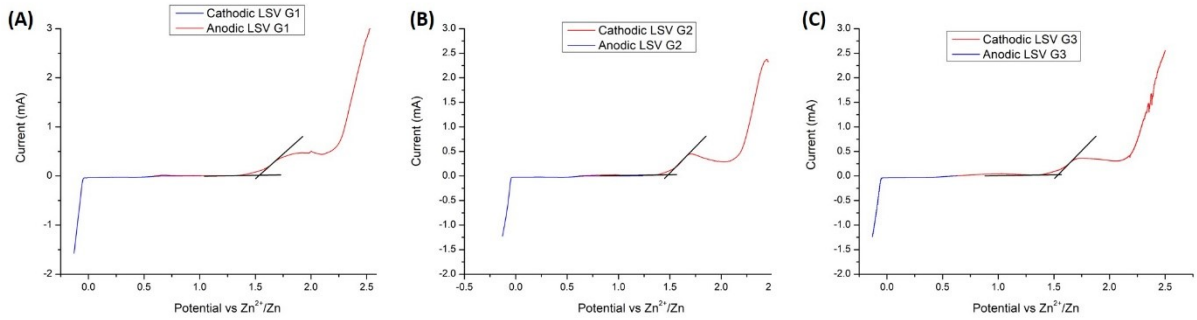

Figure S4. Cyclic Voltamperograms (CVs) that were performed at 10 mV s-1 for the three hydrogels: (A) G1, (B) G2 and (C) G3. The measurements were carried out using Zn metal as counter and reference electrode and Pt electrode (0.2 cm2) as working electrode

Section S4: equivalent circuit for mixed ionic and electronic conductors.

$$R_i = \frac{R_1 \cdot R_2}{R_2 - R_1}$$

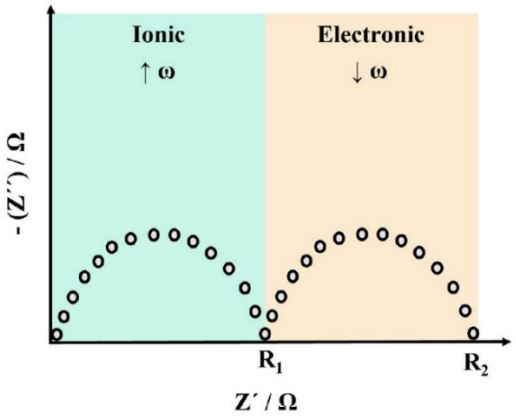

Figure S5. Equivalent circuit for mixed ionic and electronic conductors.