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Electroconductive expanded graphite–polyimide composite

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S1 A 50% solution of PI is obtained: acetone is added to the binder, the mixture is heated in a sealed container to 50 °C and kept for at least 2 hours until a homogeneous solution is obtained. The filler (from 2 to 23 wt%) is introduced into a warm binder solution and mixed to a homogeneous suspension. The mixture is dried at 70 °C to constant weight and milled with a rotary mixer.

S2 PI powder is added to the crushed (to a fraction of 1–5 mm) powder mixture until its content in the mixture is 20% and dispersed. The mixture is poured into a mold heated to at least 160 °C, and the punch is installed. Pressing is carried out to a force of 200 kg cm^{-2} at $T = 180$ °C and kept for curing.

S3 Electrochemical tests:

- S3.1 Corrosion test: The potential value was measured relative to a saturated silver chloride reference electrode (sat. Ag/AgCl).
- S3.2 Steady-state potentiostatic curves were measured from the open-circuit potential in steps of 50 mV with 900-s exposure in the anodic and cathodic directions up to potentials of 0.6 and –0.4 V (sat. Ag/AgCl), respectively.
- S3.3 When modeling the cathodic medium of a fuel cell, a constant potential of +0.6 V was applied to the samples for 24 h at a temperature of 80 °C and permanent air bubbling; current changes were measured. The anodic medium of the fuel cell was modeled by analogous measurements, but a potential of –0.1 V was applied to the electrode and hydrogen was bubbled through the electrolyte.

The dependence of conductivity on EG content is represented in Figure S1.

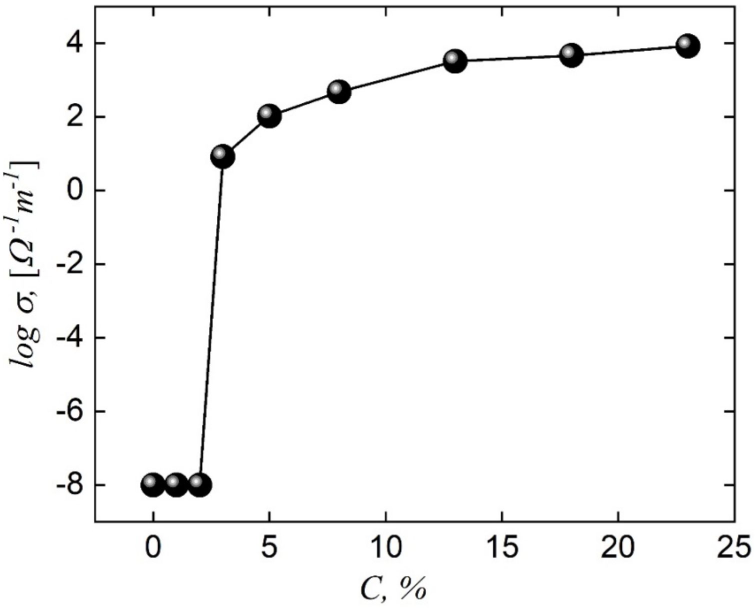

Figure S1 Dependence of conductivity on EG content.