



Supporting Information

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Reversible Conductive Inkjet Printing of Healable and
Recyclable Electrodes on Cardboard and Paper

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Dong Jin Kang¹, Yvonne Jüttke², Lola González-García¹, Alberto Escudero¹, Marcel Haft², and Tobias Kraus^{1,3*}

¹ INM – Leibniz Institute for New Materials, Campus D2 2, 66123 Saarbrücken, Germany

² PTS – Papiertechnische Stiftung, Pirnaer Straße 37, 01809 Heidenau, Germany

³ Colloid and Interface Chemistry, Saarland University, 66123 Saarbrücken, Germany

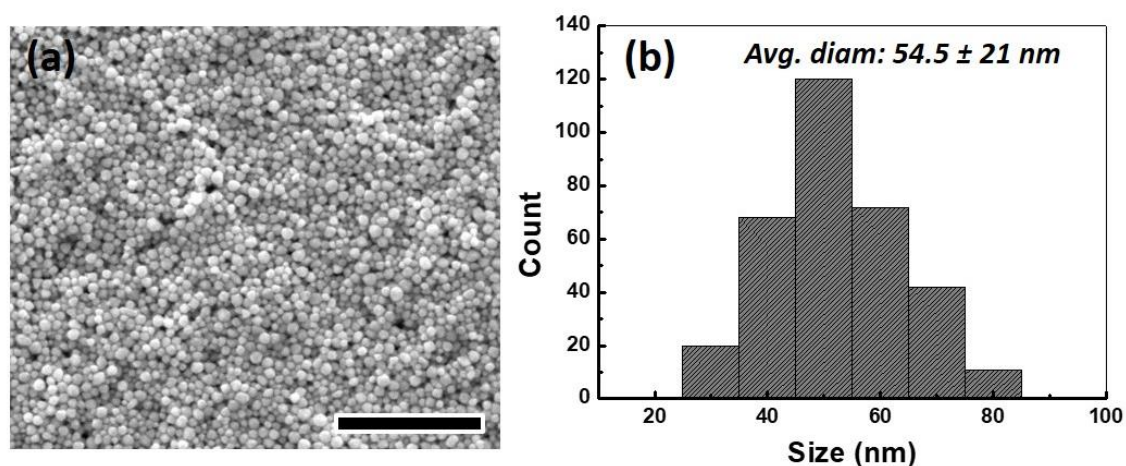


Figure S1. Size distribution of hybrid particles in the sinter-free ink. (a) Electron micrographs of the hybrid particles (scale bar 1 µm). (b) Size distribution of the particles as determined by image analysis of SEM images using ImageJ.

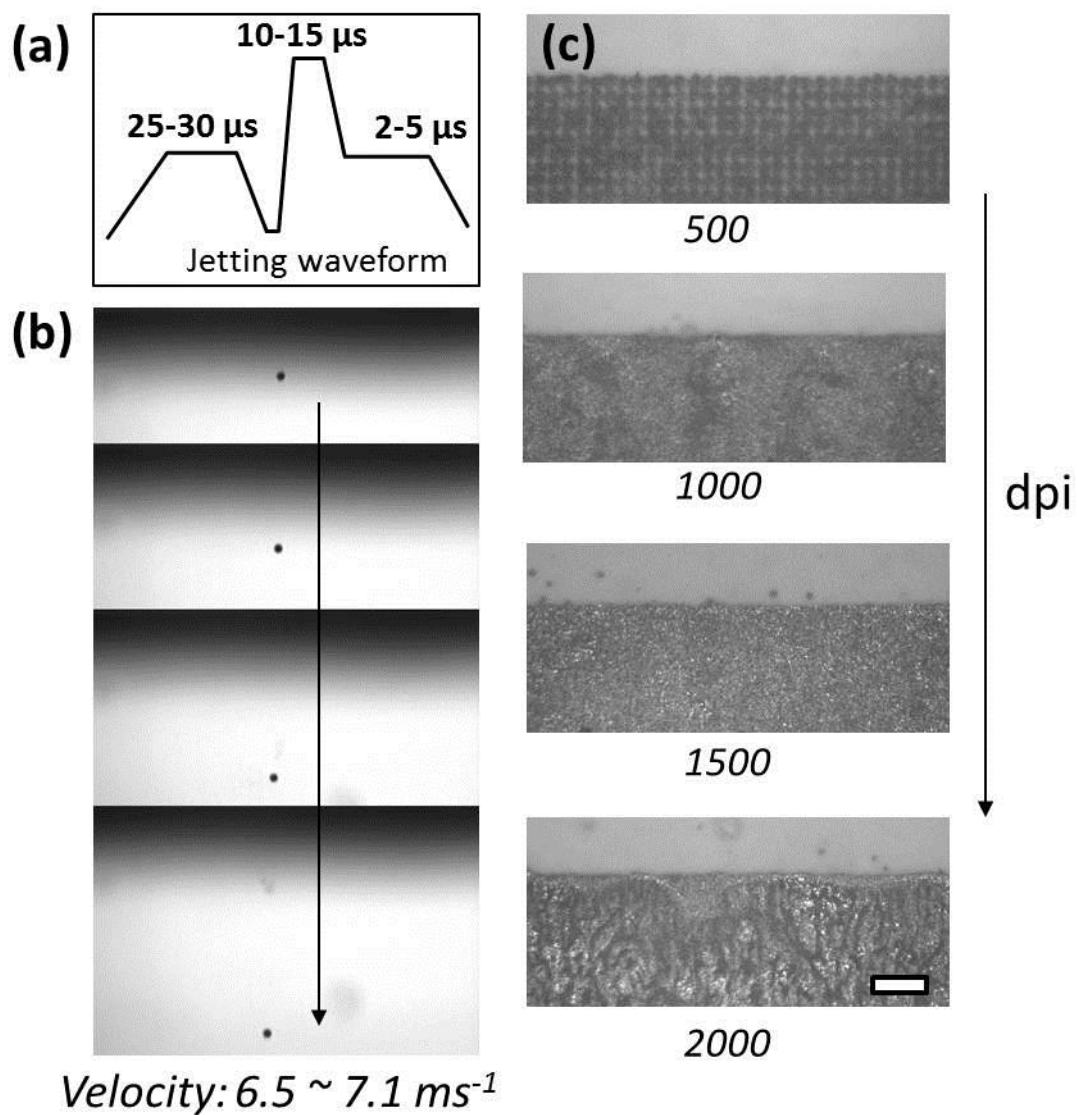


Figure S2. Inkjet printing parameters and jetting dynamics. (a) Waveform used to drive the piezo when printing hybrid ink. (b) Droplet formation and droplet. (c) Optical micrographs of printed structures at different droplet density (scale bar is 200 μm).

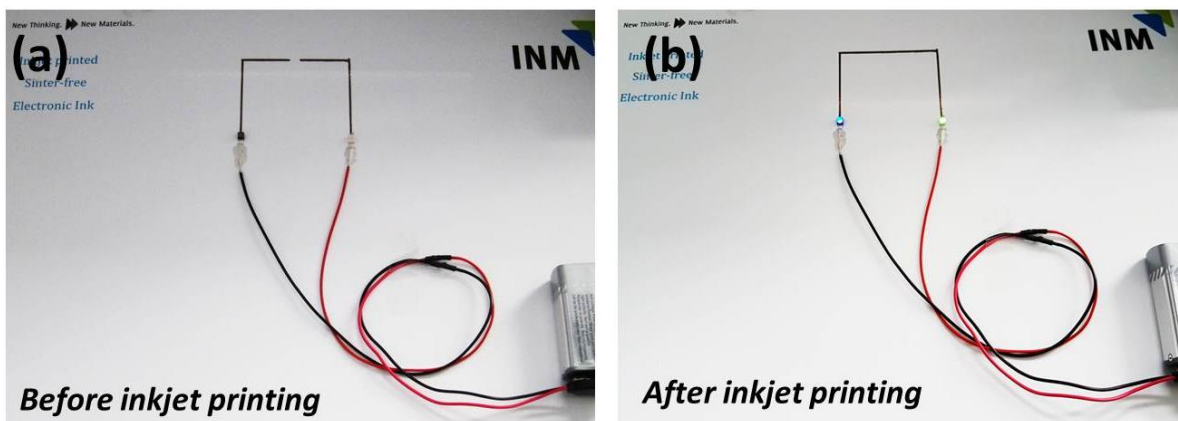


Figure S3. As inkjet printing of hybrid ink without sintering bridges the gap (a) between two electrodes, thus contacting light-emitting diodes (b) that illuminate.

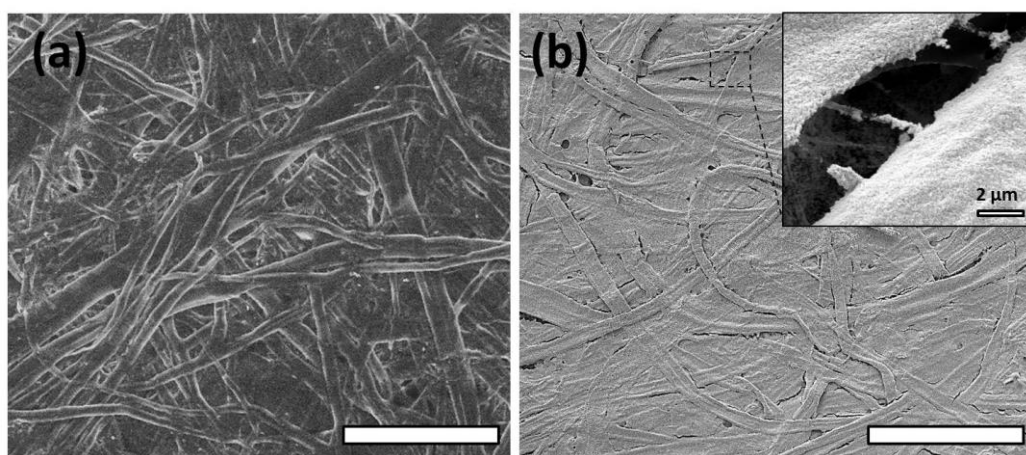


Figure S4. Surface structure of uncoated cardboard. (a) Scanning electron micrograph showing large cellulose fibres. (b) Micrographs of hybrid inks printed directly on the uncoated board at 4000 dpi show the disconnected structure of the film. (All scale bars are 200 μm).

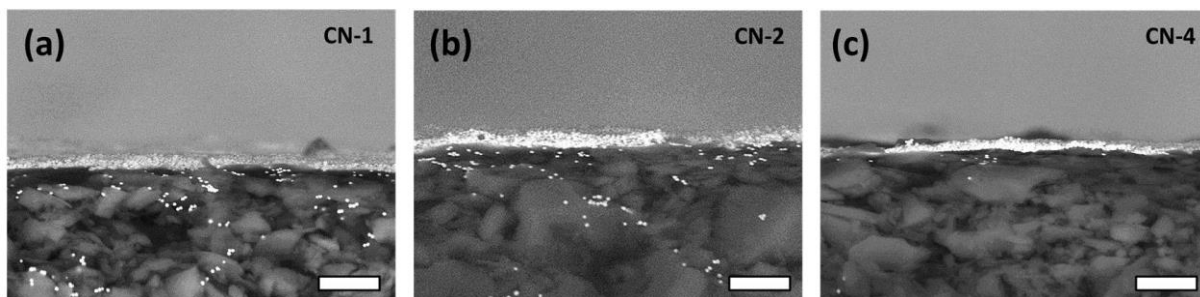


Figure S5. Cross-sectional scanning electron micrographs of printed hybrid particle films on cardboards (a) CN-1, (b) CN-2, and (c) CN-4. Scale bars are 1 μm .

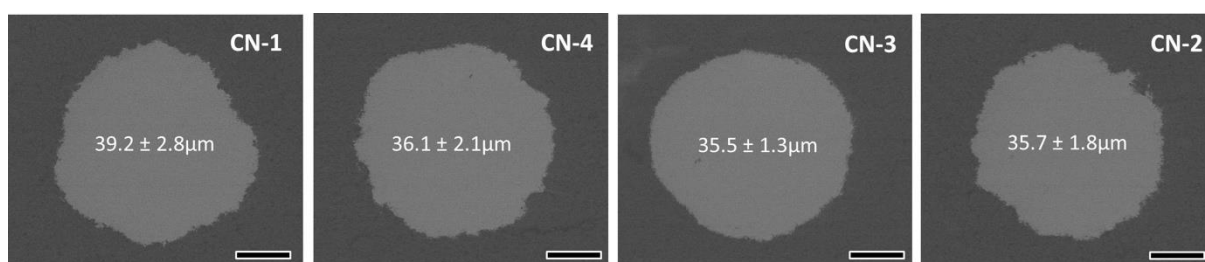


Figure S6. Scanning electron micrographs of single inkjet drops of hybrid ink deposited on different coats (scale bar is 10 μm).

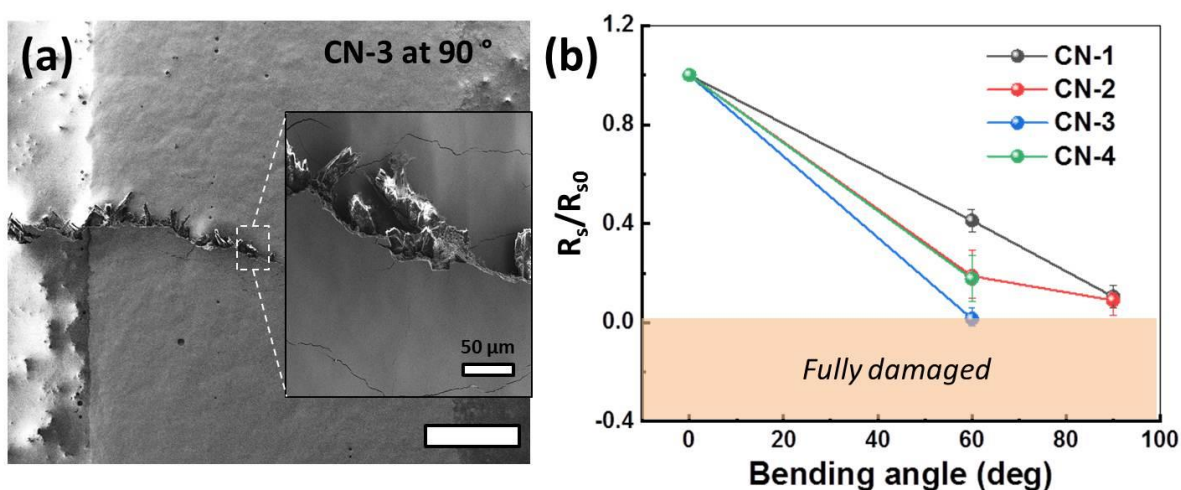


Figure S7. Electrical failure of a printed hybrid film after bending to 90°. (a) Scanning electron micrographs of the crack that disrupts conductivity (scale bar is 50 μm). (b) Normalized conductivity after bending conductive structures on the different coats to 90°.

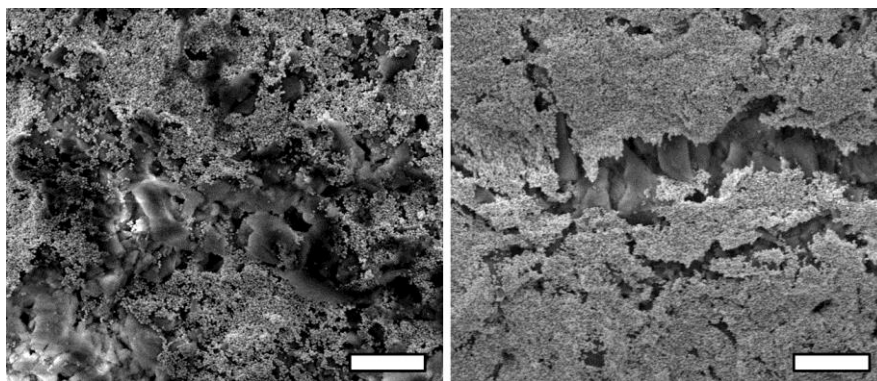


Figure S8. Scanning electron micrographs of a typical crack (scale bar is 2 μm).

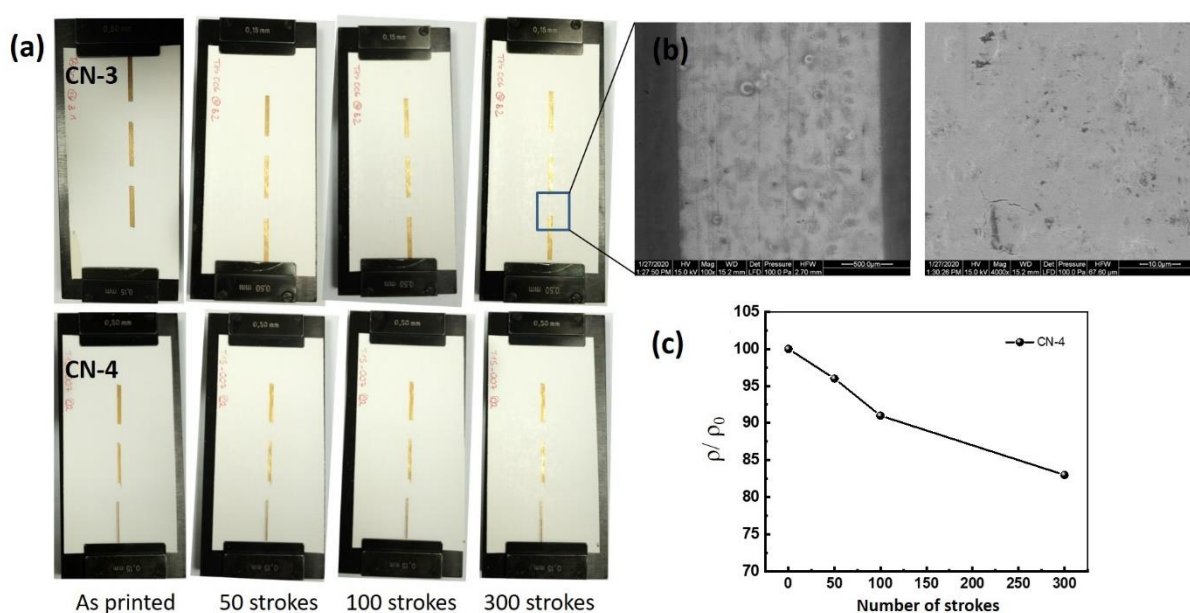


Figure S9. Printed conductive line using hybrid ink on coated cardboard, (a) A photograph of as inkjet printed hybrid ink, (b) SEM images of printed line after 500 strokes, (c) Normalized resistivity of pristine and abrasion test as function of stroke.

Table S1. Basic properties of the substrates

Samples	Basis weight [g/m^2]	Elastic Modulus [MPa]	Optical properties (CIE-Whiteness [%])
CN-1	31	2787	80.1
CN-2	30,7	2852	78.9
CN-3	30.1	2974	82.9
CN-4	29.4	3037	83.3