

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Fabrication of meter-scale SHINE fibre using a roll-to-roll process and demonstration of its flexibility.

File Name: Supplementary Movie 2

Description: SHINE fibre driven by a modern commercial EL driver at a supply voltage of 3V DC.

File Name: Supplementary Movie 3

Description: SHINE fibre emitting light instantly upon rejoining the cut fibre segments, demonstrating its immediate self-healing of electrical and optical properties.

File Name: Supplementary Movie 4

Description: Stretching the healed Ni electrode fibres that were heated at 50 °C for 3 h and 24 h respectively after being cut and recontacted.

File Name: Supplementary Movie 5

Description: Magnetic actuation of SHINE fibres that changed their shapes under a controllable magnetic field.

File Name: Supplementary Movie 6

Description: SHINE fibre continuously navigating a 3D pipe with varying geometries throughout.

File Name: Supplementary Movie 7

Description: Cutting and Self-healing of SHINE fibre while navigating a pipe, which restored its original magnetic actuation and light emission capabilities.

File Name: Supplementary Movie 8

Description: SHINE fibres integrated into a sensing-lighting system, demonstrating proximity sensing and light emission functions.