Electronic Supplementary Information (ESI)

Flexible Ribbon-shaped Coaxial Electrical Conductive Nanocables Array Endowed with Magnetism and Photoluminescence

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Assembly of the modified coaxial spinneret

Of the modified coaxial spinneret, a stainless-steel needle was connected to the inner plastic syringe just like the traditional one; the outer stainless-steel needle of the traditional coaxial spinnerets was replaced by a plastic nozzle, and connected to the outer plastic syringe. The tip of the inner stainless-steel needle was shortened 2 cm from the tip of the outer plastic nozzle.

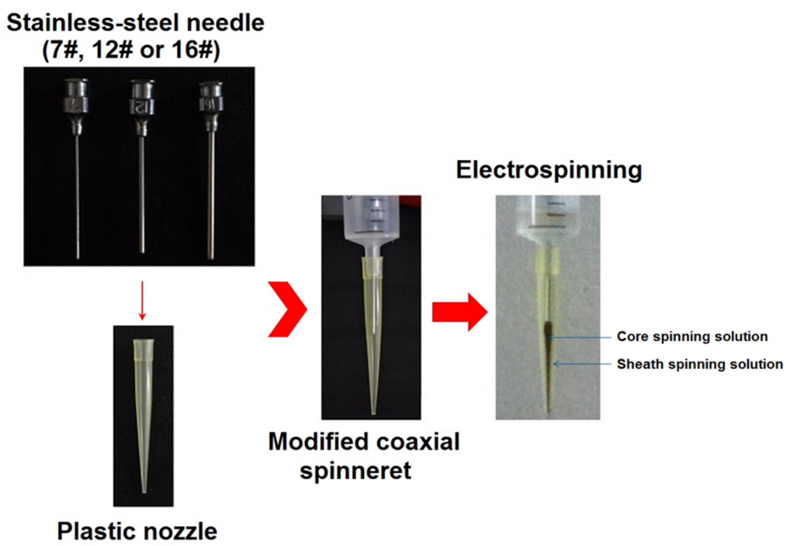

Fig. S1 Assembly diagram of the modified coaxial spinneret

Formation mechanism of electrospun ribbon-shaped coaxial nanocable

As seen in **Figure S2**, the coaxial jet was cylindrical in shape at the time when it was stretched out of the Taylor cone by electric field force, and the positive charges were uniformly distributed in the jet. After that, because the coaxial nanocable swang in the air due to the instability of electrospinning process, a tiny deformation was occured in the cross section of the jet. In this situation, the positive charges concentrated at the sections where had larger curvature radius, and a Coulombic repulsive force was produced to stretch the jet towards ribbon shape. If the surface tension of the jet (maintain the jet in cylindrical shape) could not counteract the Coulombic repulsive force, ribbon-shaped coaxial nanocable was formed.

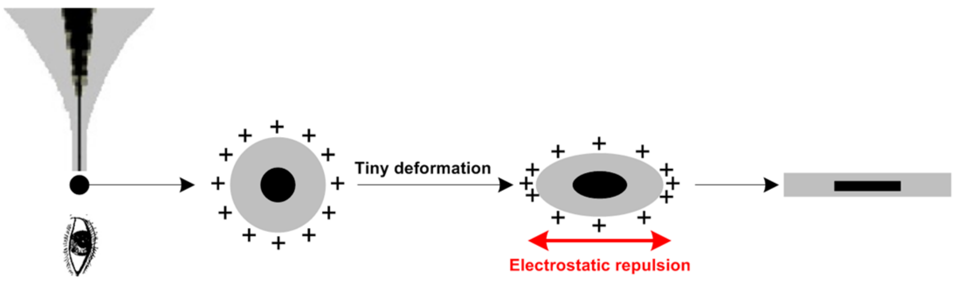

Fig. S2 Schematic diagram of the formation mechanism for electrospun ribbon-shaped coaxial nanocable

Calculation of cross-sectional area of the core of a ribbon-shaped coaxial nanocable

Figure S3 shows the schematic diagram of the cross section of a ribbon-shaped coaxial nanocable, in which T_s, W_s, T_c and W_c respectively represent the thickness of the single ribbon-shaped coaxial nanocable, the width of the single ribbon-shaped coaxial nanocable, the thickness of the core and the width of the core of the ribbon-shaped coaxial nanocable. The cross-sectional area (A) of the core can be calculated by the formula $A= T_c \times W_c$ (**Equation S1**). However, the thickness of the core (T_c) is hard to measure using existing measurement technique, and thus, other method of calculating A is needed.

Throughout the formation process of ribbon-shaped coaxial nanocable, both the core and sheath were synchronously stretched by Coulombic repulsive force, so W_c, T_c, W_s and T_s followed the relationship $T_c/T_s=W_c/W_s$ (**Equation S2**). Then the formula $A= T_s \times W_c^2/W_s$ can be obtained by combining **Equation S1** and **S2**, in which T_s, W_s and W_c can be measured by SEM and BM observation.

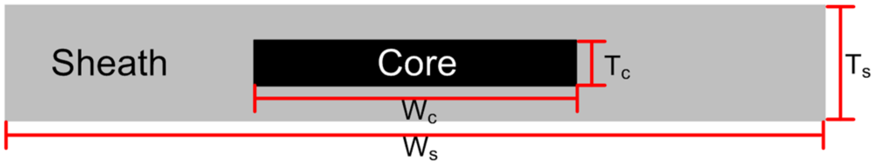

Fig. S3 Schematic diagram of the cross section of a ribbon-shaped coaxial nanocable

Assembly of the modified coaxial spinneret

Figure S4 shows the schematic diagram of electrical property of ribbon-shaped coaxial conductive nanocables array.

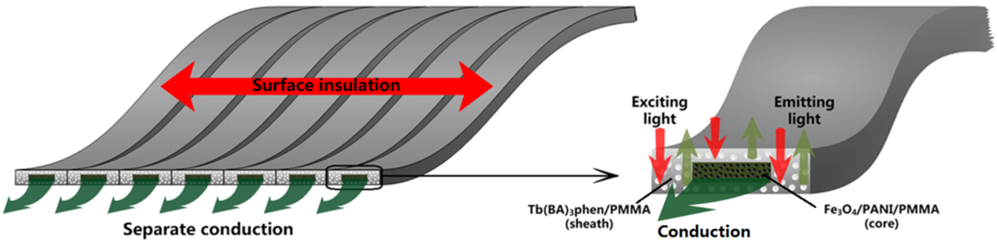

Fig. S4 Schematic diagram of electrical property of ribbon-shaped coaxial conductive nanocables array