

Transparent web-like AgNW network conductor by a microliter-scale solution process

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We report the web-like structured silver nanowires (AgNW) bundle networks by dewetting liquid thin films to produce highly transparent electrodes. Such AgNW-web structures were formed by dewetting the thin films of AgNW suspension in a mixture of isopropyl alcohol (IPA) and ethylene glycol (EG) on hydrophobized coating substrates by using meniscus-dragging deposition (MDD) technique. Length and diameter of the AgNW bundles and the open space area in the AgNW-web network can be finely controlled by varying contact angle, EG concentration, and coating parameters of the MDD process. The formation of such AgNW-web structures was well analyzed by calculating dewetting and drying times of the liquid thin films. The transparent thin films with AgNW-web structures exhibit the superior optical and electrical properties compared to the electrodes with random network of AgNW, which is well described by the high ratio of DC to optical conductivity and percolation theory in a two-dimensional matrix model. Our simple coating technique enables the deposition of AgNW-web network with high optical transparency, flexibility, and stretchability directly on polymer substrates.