

## The Flexible and Multifunctional PANI Electrochemical Device based on highly stable Ag@Pt AHNW Transparent Electrode

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### Abstract

In industry development, as a common sense, the stability of stainless steels and active metal against chemical and electrochemical corrosion have been successfully solved by introducing alloying elements with high thermodynamic stability to form solid solution[1, 2]. This inspires us to solve the critical issue with the weak stability of Ag NW based transparent electrodes by alloy method. Sun et al. have found that Ag based alloy can be prepared by a galvanic displacement reaction between Ag nanowires and precursors of more noble metals (e.g. Au, Pt, Pd)[3]. For the Ag based transparent electrode, the long nanowires can form an effective electron percolation network with superior optical transmittance and electrical conductivity compared to the shorter ones[4]. However, it still exists a challenge to synthesize large-area and long Ag NW based alloy nanowires with intact one-dimensional structure through conventional solution approaches[5] since the reaction process is complex and impacted by many factors [6-8]. Here, long, complete and uniform Ag@Pt alloy-walled hollow nanowire (Ag@Pt AHNW) is facilely obtained by combining electrochemical reaction technique and galvanic replacing mechanism. The electrode based on Ag@Pt AHNW owns high conductivity with satisfactory transparency, high thermal stability, remarkable mechanical flexibility and high resistance to chemical corrosion and electrochemical oxidation. The efficacy of the Ag@Pt AHNW based transparent electrode is demonstrated by applying it into PANI device for multifunctional electrochemical applications.

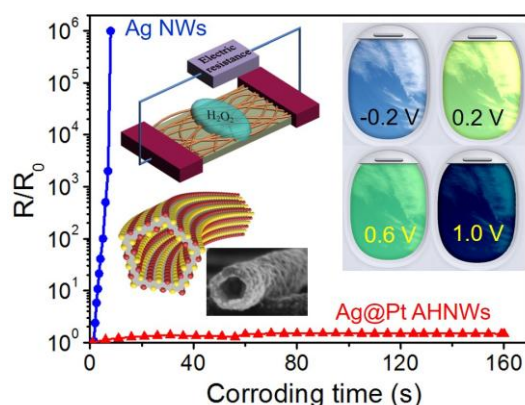


Figure 1: The designed Ag@Pt alloy-walled hollow nanowires (Ag@Pt AHNWs) show the high resistance against to chemical and electrochemical corrosion in the application of electrochromic polyaniline supercapacitor device.

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