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Preparation of TiO_2:TiN composite nanowires as support with improved long-term durability in acidic medium for polymer electrolyte fuel cells

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Supporting Information

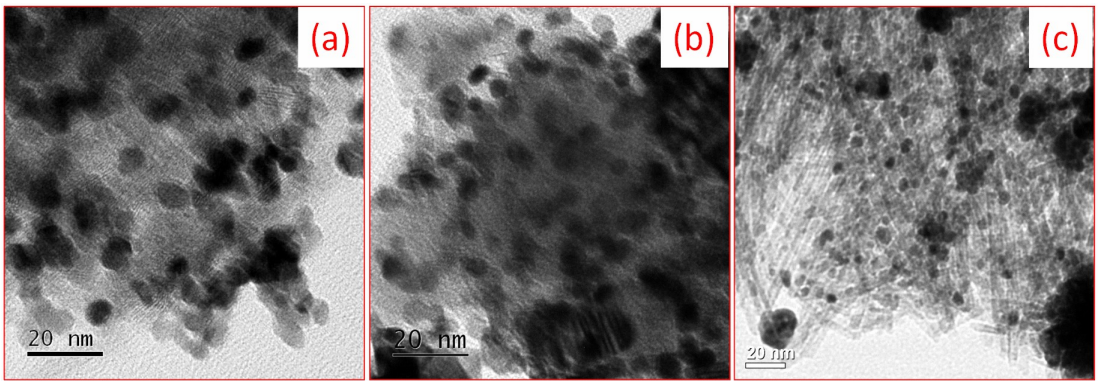

Fig. 1S (a) High magnified TEM image (a) Pt/TiO_2-NW, (b) Pt/TiN and Pt/TiO_2:TiN 2 composite nanowires.

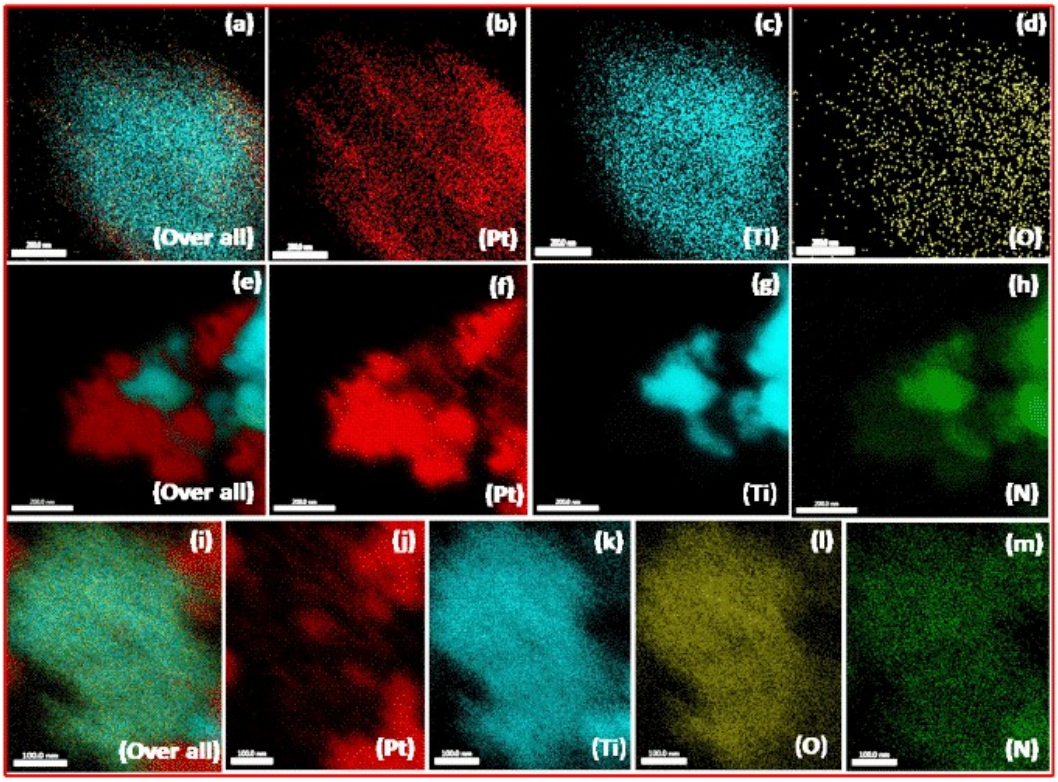

Fig. 2S (a-d) STEM mapping for Pt/TiO_2-NW, (e-h) Pt/TiN and (i-m) Pt/TiO_2:TiN 2 composite nanowires.

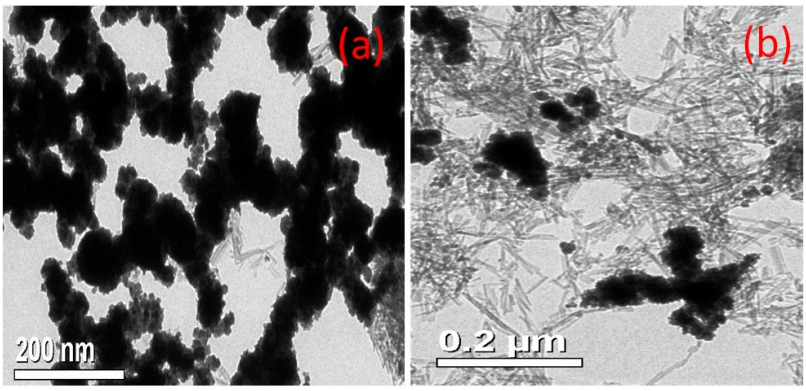

Fig. 3S TEM images for different region of Pt deposited on TiO_2:TiN 2P (simple physically mixed sample).

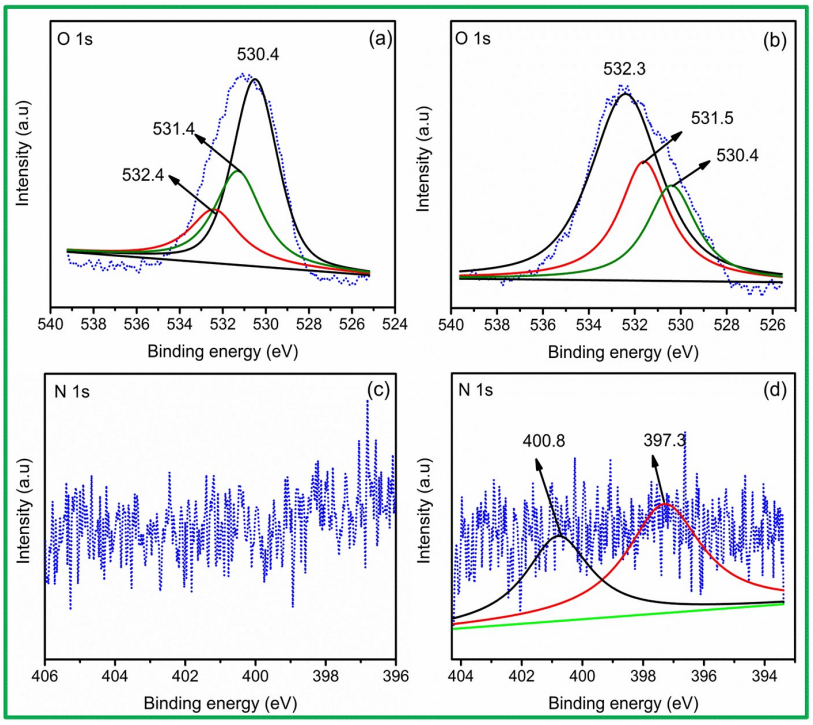

Fig. 4S XPS spectrum of Pt/TiO_2 and Pt/TiO_2:TiN 2 composite nanowires. (a & b) Oxygen 1s state and (c & d) Nitrogen 1s orbital state.

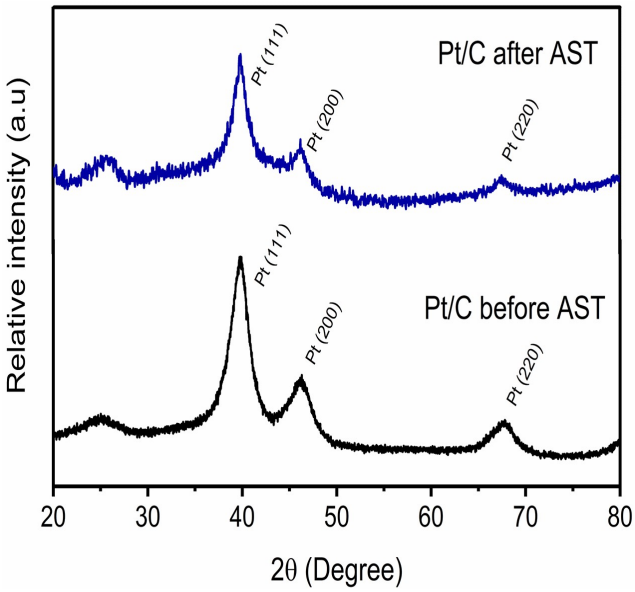

Fig. 5S XRD pattern for Pt/C electrocatalyst before and after AST.

The Pt crystallite size for Pt/C is observed to be 3.5 nm before AST and after AST it increased to 9 nm which is calculated from Pt (111) plane using Scherrer formula.

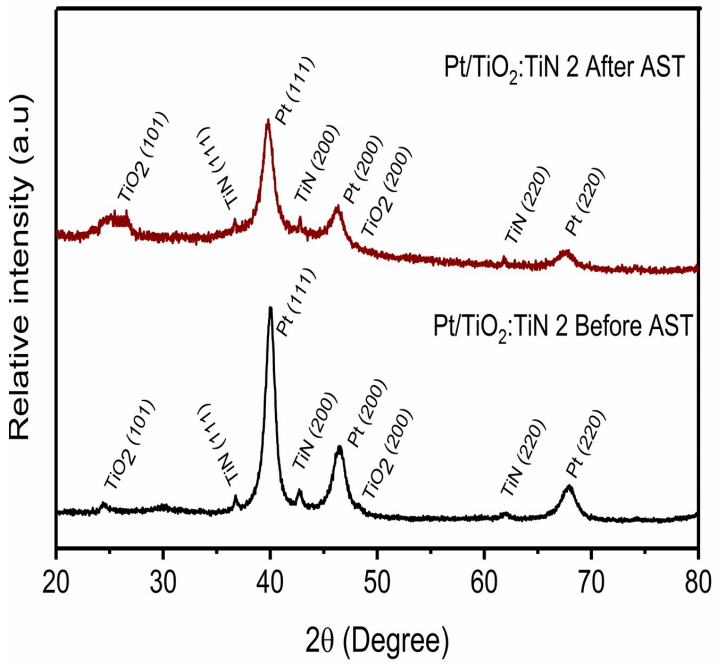

Fig. 6S XRD pattern for Pt/TiO_2:TiN 2 composite nanowires before and after AST.

Before AST for Pt/TiO_2:TiN 2 composite nanowires, the Pt crystallite size is observed to be 5 nm and after AST, the particle size increased to 7 nm.

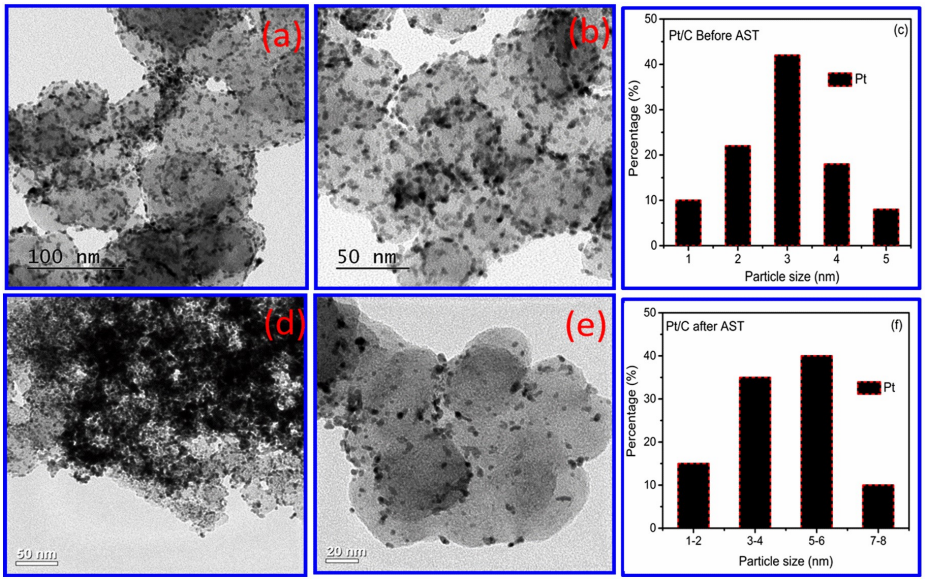

Fig. 7S TEM micrographs and Pt particle size histogram for Pt/C: (a-c) before and (d-f) after AST.

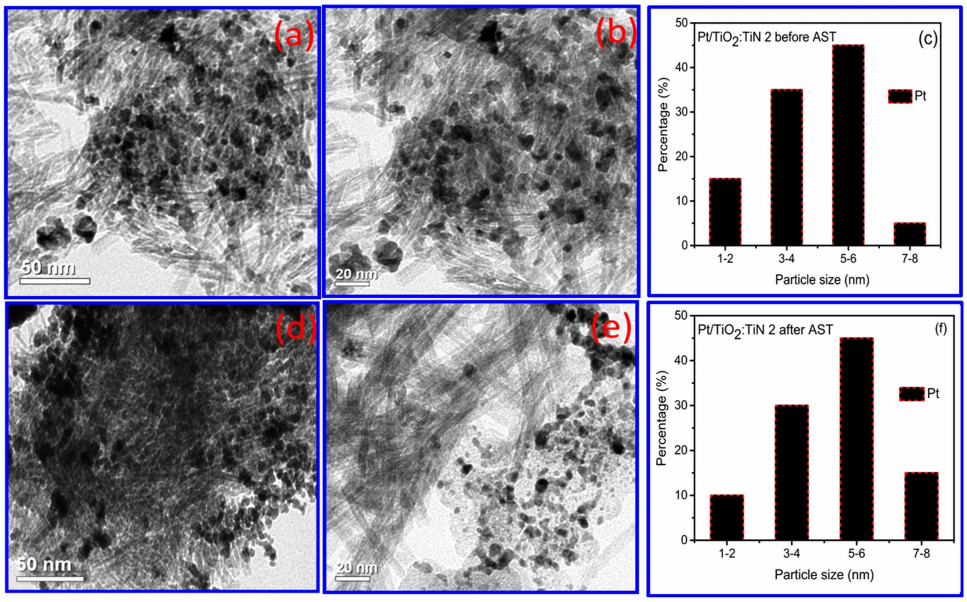

Fig. 8S TEM image and Pt particle size histogram for Pt/TiO_2:TiN 2 composite electrocatalyst (a-c) before and (d-f) after AST.

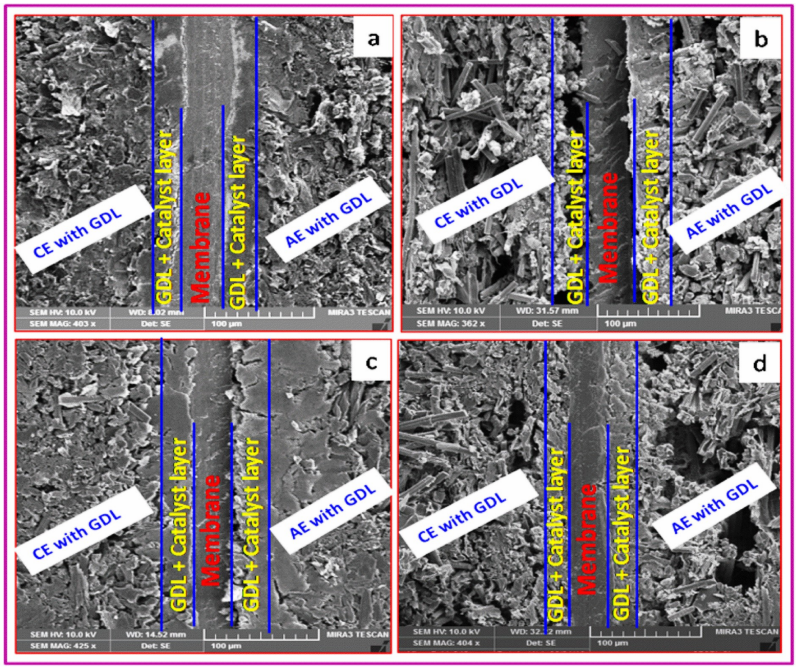

Fig. 9S FE-SEM cross section image: (a & b) before and after AST for Pt/C and (c & d) before and after AST for Pt/TiO_2:TiN 2 composite nanowires (AE & CE for anode and cathode electrodes).