Electrochromism can be defined as the capability of a material to alter its optical properties within the whole electromagnetic spectrum under an applied voltage, in the visible region (400–800 nm) and in the near-infrared (NIR) region (e.g., 1000–2000 nm)1. This property can be found among several organic and inorganic compounds. It is generally related to the presence of a mixed redox state of the metallic center for MxOy or to highly conjugated systems of conductive polymers.

The focus for this study is the conjugated polymer-based organic-inorganic hybrid electrochromic (EC) materials. In order to provide hybrid EC materials, the WO3 powder were modified separately with EDOT (3,4 ethylenedioxy thiophene) and TiCl4 by using rf rotating plasma method. The applied parameters for both EDOT and TiCl4 treatment were exhibited at Table 1.

Table 1. Rf rotating plasma modification parameters of WO3

Sample	Pressure	Rf power	Duration
EDOT	2x10-2 Torr	50 W	15 min
TiCl4	5x10-2 Torr	50 W	15 min

After modification, the hybrid WO3 powders were deposited by an e-beam technique onto conductive ITO substrates. EC device were prepared by sandwiching the appropriate gel electrolyte between ITO electrodes previously coated one side with the hybrid molecules of WO3/EDOT or WO3/TiO2. The cyclic voltammogram and optic measurements were performed to investigate the EC device performance. Morphological structure of samples was lightened SEM and AFM analyses. According to these results, different type of hybrid structures of WO3 effectively indicated better EC's activity than WO3.

1. V. K. Thakur, G. Ding, J. Ma, P. S. Lee, X. Lu, "Hybrid Materials and Polymer Electrolytes for Electrochromic