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# DIGITAL IMAGE CHARACTERIZATION OF ELECTROCHROMIC CONDUCTING POLYMER AND TEXTILE COMPOSITES

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Color is one of the most important parameters we use to evaluate our surroundings. While understanding color signals correctly is crucial in our everyday life, it also has a lot of sentimental meaning. Color, or change in color can be used to express emotions or just for aesthetic reasons. A promising way to create flexible communicative devices is combining electrochromic materials with textile substrates. Electrochromic conductive polymers provide a great variety of colors [1], rapid response times and are comparatively easy to work with [2].

In this study, we report the electrochemical synthesis and characterization of conducting polymers polyaniline (PANI) and 3,4-dioxytiophene (PEDOT) and textile substrate composites. Potential induced electrochromic color change of conductive polymer composites was filmed and then analyzed with video analysis software ImageJ. All videos were taken in special recording box with LED lighting. Using ImageJ every pixel is expressed as combination of three primal colors: red (R), green (G), blue (B) [3]. During the analysis color channels are separated and the change of their intensities in time measured (Fig. 1).

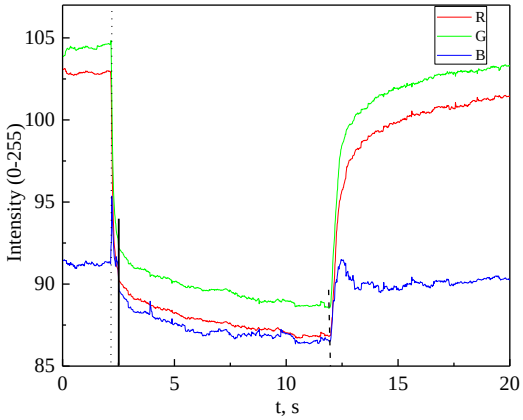


Fig. 1 Color intensity measurement of PANI-PES-Cu-Ni

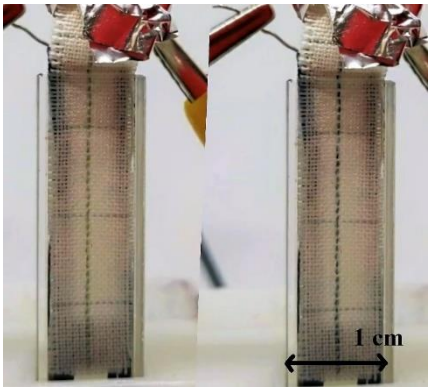


Fig. 2 Electrochromic color change of polyaniline

Conductive polymer and textile structures demonstrated reversable color change that was successfully evaluated using ImageJ. Visible color for PEDOT is from dark to light blue and for PANI from green to blue (Fig. 2). These results indicate that there is a great potential provided by textile and conductive polymer composites creating flexible wearable displays in the future.

**References**

[1] Gaupp CL, Reynolds JR, Multichromic copolymers based on 3,6-bis(2-(3,4-ethylene- dioxythiophene))-N-alkyl carbazole derivatives, Macromolecules 36, 6305–6315 (2003).
[2] Dirk Schawaller, Michael Voss, Volker Bauch, Erik Frank, Michael R. Buchmeiser; Flexible, switchable electrochromic textiles, Macromol. Mater. Eng.p. 330–335 (2013)
[3] Abramoff, M.D.; Magalhães, Paulo J.; Ram, Sunanda J., Image processing with ImageJ, Biophotonics international, 11, 36 – 42 (2004)