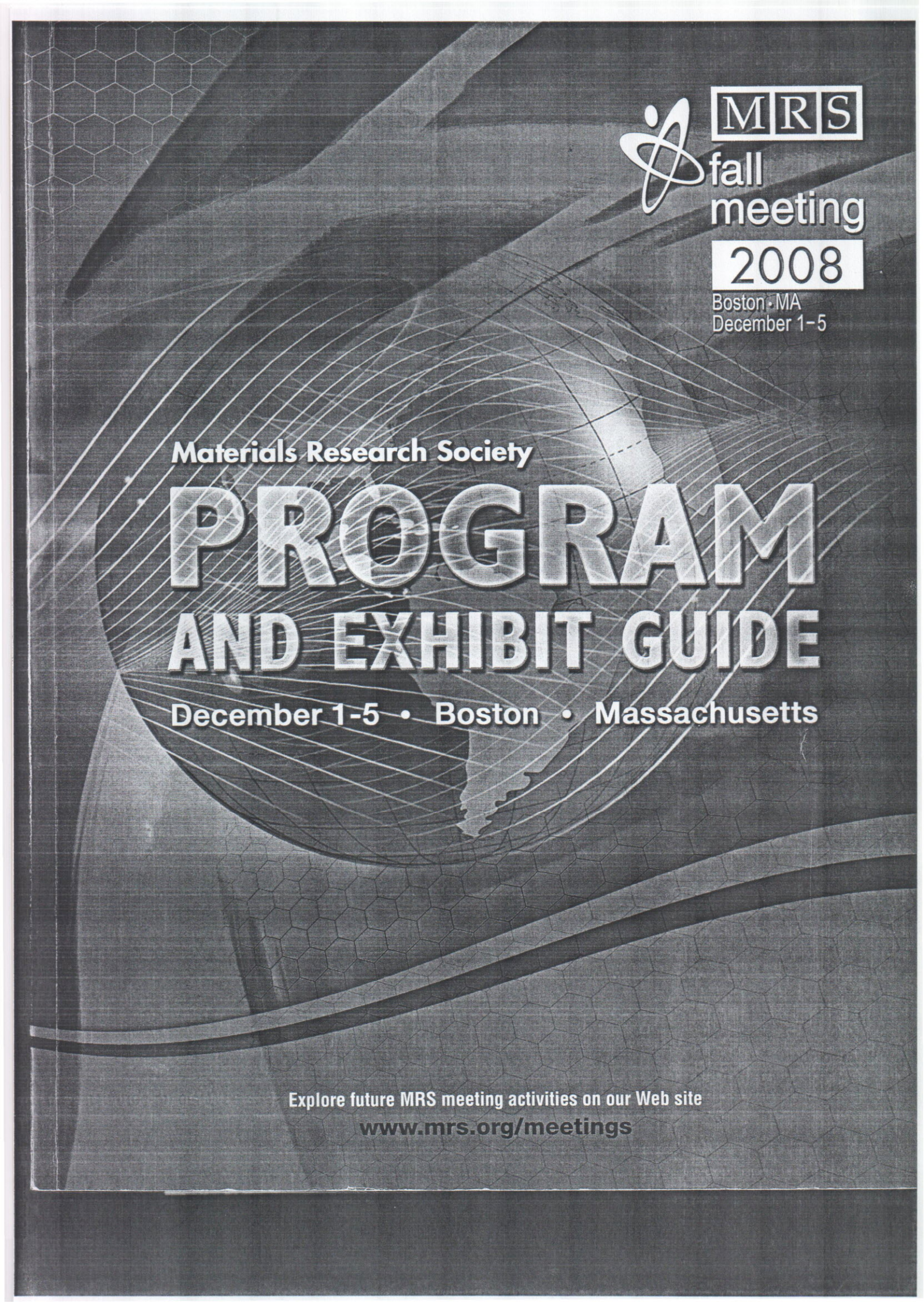
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Abstract Number: G14.2 **Day / Time:** Thursday, Dec. 4, 2:00 PM - 2:15 PM

Disposable and Flexible Optical pH Sensor Developed using Line Patterning Technique and Thin Film of Polyaniline.

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In the last ten years the interest for developing new sensors for industry, agriculture, the environmental, and applications in medicine has increased. The line patterning technique [1] was used to make a mask to developing a low-cost optical pH sensor, built in the stripes of poly(ethylene terephthalate) (PET) film, using the features of a thin film of polyaniline (PANI) in the emeraldine oxidation state [2] doped with HCl, by *in-situ* chemical polymerization. The measurements occurred with conductive polymers doped and dedoped, and were used to evaluated the pH of natural water. The differential scanning calorimetry (DSC) of the poly(ethylene terephthalate) (PET) film was obtained, to characterize the measurement of the enthalpy. The DSC was taken using TA INSTRUMENTS, Model DSC Q100. The temperature associated with transitions of the PET, as a function of time, was 251.7 °C. The UV-Vis absorption of the samples was investigated using a SHIMADZU spectrometer set up in the wavelength range of 300nm to 1100nm. The technique was used to evaluate the effect of the temperature to do the syntheses - responsible to change the thickness of the thin film onto PET - as well the optical response of the samples under the influence of the distinct pH in the laboratory and natural water. The relation between common techniques, used to measure the value of water pH (Horiba) in the natural condition, was compared. The images to investigate the thickness and morphology of the thin film of the PANI adsorbed onto PET were obtained using an Atomic Force Microscope (AFM) Nanoman V, from VEECO. A silicon rectangular shaped cantilevers, with spring constant (K) 2.0 $N.m^{-1}$, was chosen. The scan rate of the samples was 1.5 Hz and "quasi" non-contact mode, at room temperature, was used. The color change of the samples, in function of pH, after 5, 10 and 15 minutes, was obtained in buffer solution, to evaluating the appropriate immersion time of the PET/PANI. The stripes showed a reversible color features upon variation of the pH. The pH ranges used to calibrate the optical sensor were from 2.0 to 12.0. The behaviors of absorption spectra were obtained with the stripes under buffers solutions of different pH, with steps of 0.5, from 4.0 to 8.0. The sensitivity and reproducibility were calculated. The investigations open new opportunities to develop optical "throw-away" sensors, from the optical properties of the thin film of the polyaniline and nanofibers of PANI onto PET.

Work supported by CNPq, (Brazilian funding agency) under contract number 485921/2006-5, 49.0807/2007-0, the facilities from Embrapa Agricultural Instrumentation and Macroprogram 1 (MP1) - 01.05.101.00 [1] E. C. Ven Â ncio, L. H. C. Mattoso, P. S. P. Herrmann Junior, A. G. MacDiarmid, Sensors and Actuators B, 130, 723-729, (2008) [2] A. E. Job, P. S. P. Herrmann, D. O. Vaz, L. H. C. Mattoso, J. Applied Polymer Science, 79, 1220, (2001).

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