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# Tag Devices Comprising Self-Compensating Zwitterionic Polymers

### Background

Conductive structures made from conductive polymer films are used in a wide variety of applications and often offer advantages over their metallic counterparts. For example, conductive structures made from conductive polymers can offer advantages in cost, flexibility, weight, form factor and ease of manufacturing to name a few. For example, conductive structures made from conductive polymer films can be used for connecting, fastening and electromagnetic shielding, to name a few applications. Some conductive polymers comprise conjugated double bonds which provide the electronic conduction. Redox-active polymers are conducting polymers comprising functional groups capable of reversibly transitioning between at least two oxidation states wherein the transition between states occurs through oxidation (i.e. electron loss) and reduction (i.e. electron gain) processes. In addition to redox activity provided by the redox center, some redox-active polymers may be electrically conductive through the polymer chain (e.g. polyaniline).

### Invention Description

Researchers at Arizona State University have developed devices comprising conductive polymers and more particularly tagging devices comprising a redox-active polymer film, and method of using and manufacturing the same. In one aspect, an apparatus includes a substrate and a conductive structure formed on the substrate which includes a layer of redox-active polymer film having mobile ions and electrons. The conductive structure further includes a first terminal and a second terminal configured to receive an electrical signal therebetween, where the layer of redox-active polymer is configured to conduct an electrical current generated by the mobile ions and the electrons in response to the electrical signal. The apparatus additionally includes a detection circuit operatively coupled to the conductive structure and configured to detect the electrical current flowing through the conductive structure.

This innovation is covered by:

- [U.S. Pat. No. 10,909,437](#)
- [U.S. Pat. No. 10,482,367](#)

- U.S. Pat. No. 9,990,578