

**ARTIFICIAL MUSCLES USING POLYPYRROLE CONDUCTING
POLYMER**

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ABSTRACT

Artificial muscle is a possible application of the Polypyrrole (PPy) film. The ability to control the mechanical movements of a PPy bilayer strip by controlling the applied voltage makes it functioning as a smart muscle or a cantilever.

The artificial muscle is actually an electromechanical actuator that is based on the redox activity. Conducting polymer (CP) electromechanical actuators have several advantages over piezoelectric actuators. PPy is one of the most appropriate CP to be used to make an artificial muscle. Therefore, a bilayer structure with a PPy film which performs as an artificial muscle was designed, constructed, and tested in this study with the objective to obtain a Polypyrrole artificial muscle with better performance.

The PPy films were synthesized by electrochemical polymerization and their performance in artificial muscles was studied by cyclic voltammetry.

An artificial muscle constructed with a PPy film of 2 cm-length and 1 μm thickness that was fabricated at the current density of $62.5 \mu\text{A cm}^{-2}$, resulted a deflection of 1.31 cm in this study .That was the maximum deflection obtained in this study.

As the stability of the PPy artificial muscle is of importance for practical applications, the stability measurements were also carried out. The most stable artificial muscle was that constructed with a PPy film polymerized at the current density of $62.5 \mu\text{A cm}^{-2}$.

