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# Polysquaraines: Novel Humidity Sensor Materials with Ultra-High Sensitivity and Good Reversibility

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## Abstract

Various materials have been successfully applied in commercial humidity sensors, but their response/recovery time and sensitivity need to be improved. In this paper, a novel humidity sensor was fabricated based on a polysquaraine (PMPS), which is of resonance-stabilized zwitterionic structure. Relative humidity (RH) in the range of 33-95% was able to determine by testing the impedance response at room temperature (25 °C). The variation of impedance is greater than four orders of magnitude, the highest among all conjugated polymer materials. The response/recovery time is as short as 3/16 s, comparable to that of most commercial humidity sensors. Electrical doping and hydronium transportation are attributed to the impedance change. The results indicate that polysquaraines may be promising materials in humidity sensing.

**Keywords:** Humidity sensor, squaraine, polysquaraine, resonance-stabilized zwitterionic, impedance model

## Introduction

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