

عنوان مقاله:

Efficient and Cost-Effective Fabrication of PMMA Micropores for Resistive Pulse Sensing

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خلاصه مقاله:

This paper delves into the optimization of Poly(methyl methacrylate) (PMMA) micropore size using a comprehensive experimental approach. It begins by highlighting the advantages of PMMA, introducing the concept of drilling a microscale pore in PMMA, and subsequently reducing its size through the application of pressure and heat. The primary goal is to comprehend the influence of pressure, heat, and time on pore dynamics and size alteration. Employing the Taguchi Design of Experiments (DOE), the study systematically investigates the impact of these factors by subjecting a primary $500\text{ }\mu\text{m}$ pore to variations in pressure, heat, and time. The results demonstrate the substantial impact of temperature on pore size reduction at higher temperatures, with pressure exhibiting a significant effect up to 1 bar , diminishing thereafter, and time gradually decreasing over the experimental duration. Further exploration focuses on achieving the smallest possible pore size using a $200\text{ }\mu\text{m}$ drilled micropore, refining it to below $20\text{ }\mu\text{m}$. Ultimately, the micro-sized pore is utilized in a resistive pulse sensing (RPS) setup, revealing resistance variations associated with different pore sizes. This promising technique holds potential for future applications in RPS setups, facilitating the enhanced analysis and detection of proteins or other minute particles.

کلمات کلیدی:

PMMA, micropore, microfabrication, RPS

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