Use of melt blown polypropylene nanofiber templates to obtain homogenous pore channels in glycidyl methacrylate/ethyl dimethacrylate-based monoliths

ABSTRACT

An important characteristic of a monolith is its porous structure. However, it is difficult to obtain a homogenous porous structure in a monolith due to dead-end and uneven distributions of pores, but nanofibers can act as templates to induce a porous structure. Hence, the aim of this research was to study melt-blown polypropylene nanofibers produced under process conditions designed by response surface methodology (RSM), i.e., air pressures between 0.30 and 0.50 MPa, motor speeds between 30 and 50 Hz, and die-to-collector distances between 20 and 50 cm. The air pressure was found to be an important factor in determining the diameters of the fibers from the RSM analysis, and we found the diameters to be between 3.58 and 11.00 × 103 nm. Macropore monoliths were fabricated successfully with conditions of 0.45 MPa, 40 Hz, and 60.23 cm. Thus, it was concluded that polypropylene nanofibers can be used as a template to produce a monolith.