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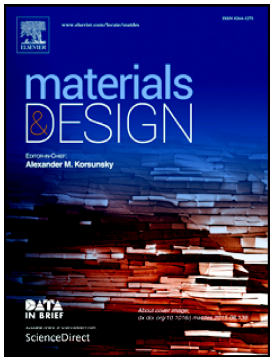

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Hierarchically Porous Materials Prepared by Selective Laser Sintering

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Abstract: A novel method to design and manufacture hierarchically porous materials is proposed by combining Selective Laser Sintering (SLS) with particulate leaching technique. Hierarchically structural porous nylon is prepared and pore forming mechanism is discussed. Experimental results show that the porous materials contain the pores caused by the dissolution of the pore-forming agent in water and the pores existing inherently in SLS parts, which can be further divided into intraformational pores and interlaminar pores. The interactions of these pores with different shapes eventually form hierarchically porous nylon with high connectivity and controllable porosity. The influences of processing parameters and content of pore-forming agent on the porosity and water permeability have been studied. Porous nylon filter integrated with complicated structure is designed and directly fabricated by SLS. The fluid infiltration volume is tested and compared with commercially available water purifiers. The results of filtration experiment show that the filtering precision is about 17.6μm and the rejection is up to 95% for the suspension containing particles with the size range of 15μm-120μm.

Key words: selective laser sintering, polyamides, porous material, filtration, water