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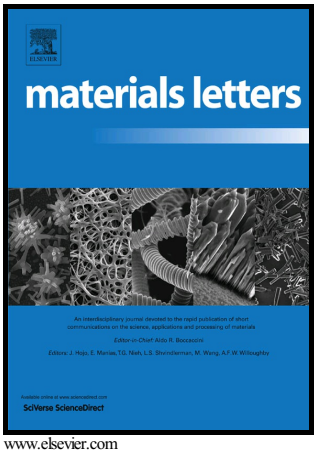

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Abstract

Here we propose an effective and succinct method to generate graded porous material architectures in a mathematical way. Pores with gradient pore sizes, types, orientations and porosities can be integrated to create a single architecture. The resulting structures can be readily produced by using additive manufacturing (AM) techniques for medical applications. We give relevant examples of constructing several kinds of gradient porous scaffolds and discuss their respective characteristics for use in cell culture studies.

Keywords: gradient porous structures; additive manufacturing; tissue engineering scaffolds.

1. Introduction

In tissue engineering, porous scaffolds can provide a temporary environment to promote cell adhesion, proliferation, and differentiation to guide the formation of new tissues and organs [1-3]. Scaffold pore size is an important factor which affects tissue regeneration efficiency. Thus, it is desirable to investigate cell function using a gradient porous scaffold consisting of different pore sizes [4]. Such scaffolds can be used for scientific research as well as clinical applications. For example, we can compare the effect of different pore architectures on cells under the same conditions