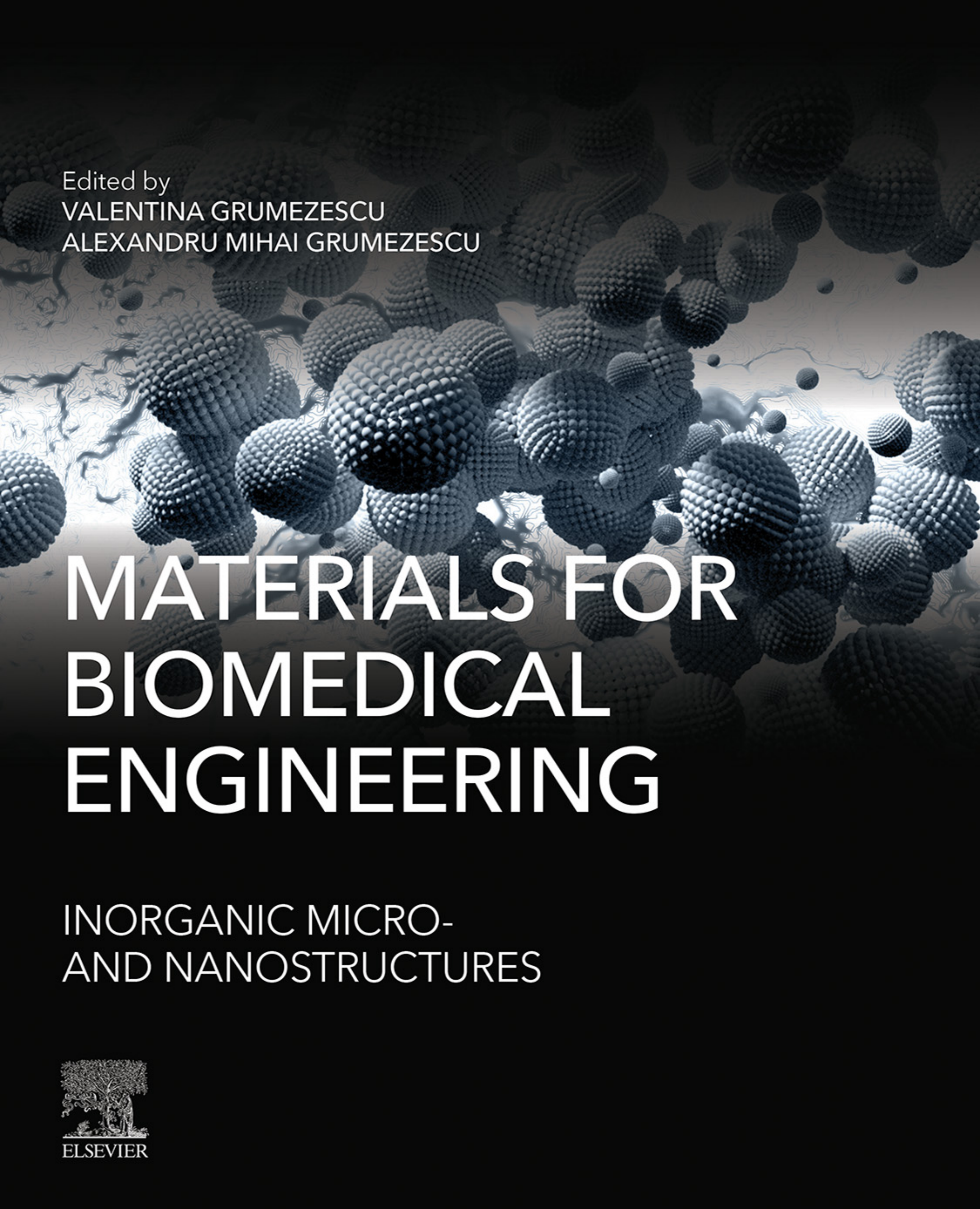
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MATERIALS FOR
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INORGANIC MICRO-
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ELSEVIER

CHAPTER

Bioactive glass nanofibers for tissue engineering 10

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10.1 INTRODUCTION

10.1.1 DEFINITION OF NANOFIBER

The most common manifestation of nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1–100 nm. This definition was popularized by the National Nanotechnology Initiative (NNI) of the United States federal government program and this range of dimensions for the nanoscale was specified in an International Standard (ISO/TS 80004-1:2015). According to its definition, a nanofiber is a fiber with two external dimensions in the range of 1–100 nm and the third dimension significantly larger (ISO/TS 80004-2:2015). However, there does not seem to be a consensus about how much "significantly larger" it must be. If we consider the diverse definitions of fibers, this dimension should vary from more than 100 times the diameter (Wallenberger et al., 2000), to greater than 1000 times (Tanioka and Takahashi, 2016). Alternatively, there are some definitions of nanomaterials, and specifically of nanofibers, which describe them in terms of their properties and functionality rather than their dimensions. In fact, the very same standard which specifies the range of dimensions for the nanoscale, states that nanotechnology manipulates matter, predominantly in the nanoscale, to make use of size- and structure-dependent properties and phenomena distinct from extrapolation from larger sizes of the same material (ISO/TS 80004-2:2015). In this sense, the extension of the range of diameters proposed by some authors in the definition of nanofiber from 1 to 1000 nm is justified, because some significant phenomena are observed between 100 and 1000 nm (Tanioka and Takahashi, 2016). Specifically, in the field of bioactive materials, different noticeable "nanoeffects" were demonstrated in several studies for nanofibers with diameters in the range of 0.1–1 μm: Woo et al. (2003) produced nanofibrous architectures of poly(L-lactic acid) with diameters of between 50 and 500 nm by thermally induced phase separation, and they demonstrated that the nanofibrous scaffolds adsorbed larger amounts of fibronectin and

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