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## 学位（博士）論文要旨

(Doctoral thesis abstract)

論文提出者 (Ph.D. candidate)	工学府博士後期課程 応用化学専攻 (major) 2018 年度入学(Admission year) 学籍番号 18832205 氏名 西村 真之介 (student ID No.) (Name)
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論文題目 (Title)	Development of porous biomaterials prepared by using spontaneous emulsification
論文要旨 (2000 字程度) (Abstract(400 words)) ※欧文・和文どちらでもよい。但し、和文の場合は英訳を付すこと。 (in English or in Japanese) <p>The aim of this doctoral thesis is the development of novel porous biomaterials using a low-energy-emulsification method. Emulsions have been traditionally used for product development in familiar areas such as food and cosmetics. In the medical field, droplets of emulsions have been mainly used to form drug carriers. In recent years, spontaneous emulsification, in which emulsions are formed by using the chemical energy inherent in the system without external energy application, has attracted attention. Although the mechanism of spontaneous emulsification is only partially understood, it is being actively studied due to its low energy cost and low potential to destroy drugs. Previous studies using spontaneous emulsification have been limited to the preparation of spherical particles where the emulsification forms o/w emulsions as particle precursors. On the other hand, a new technique to prepare porous particles was recently reported where an amphiphilic block copolymer, poly(ethylene glycol)-<i>b</i>-poly(lactic acid) (PEG-PLA), was used as a surfactant to induce spontaneous “w/o” emulsification and porous particles were obtained with only a single moderate energy application. Porous materials are useful in the medical field for various applications such as pulmonary drug delivery system, tissue regeneration, and cell culture. Therefore, in this study, the development of porous particles and porous films was investigated under the concept of "using</p>	

spontaneous emulsification to form a porous internal structure of materials". In Chapter 1 of this doctoral thesis, recent advance and perspective for emulsions, emulsification methods including low-energy emulsification, and porous materials are reviewed. Various porous materials, including porous particles prepared through double emulsions as precursors, have been skillfully used as biomaterials. Therefore, the features and applications of various forms of porous materials used in the medical field are especially reviewed. In Chapter 2, the applicability of developed porous particles for pulmonary delivery was discussed. In Chapter 3, to elucidate the aerodynamic behavior of the porous particles, the method to control the porous surface and internal structures independent of the molecular weight of the PEG block was proposed. In Chapter 4, a new method for film fabrication was investigated by using spontaneous emulsification phenomenon, which has been used only for porous "particles" preparation. The result presented in this thesis has provided a new technique to prepare the low-energy-fabrication of porous materials for potential applications as biomaterials using spontaneous emulsification.

(英訳) ※和文要旨の場合(400 words)