

課題番号 : F-19-NU-0074  
利用形態 : 機器利用  
利用課題名(日本語) : 食品廃棄物からの高付加価値物の回収  
Program Title (English) : Recovery of value-added products from food wastes  
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## 1. 概要(Summary)

Calcium phosphate (Ca-P) nanoparticles are very useful multi-functional biomaterials with high values and have lots of applications in various fields [1]. There have been many reports about the synthesis of Ca-P nanoparticles using different Ca and P resources, accompanying with various surfactants or templates via various routes [2].

Bone waste is a kind of normal food wastes everywhere in the world. Most of the bone wastes are burned as a kitchen waste directly. Some of the bone wastes are collected and used to make metal and bone meal for animals or bone powder as food or nutrient additives [3]. However, the values of these applications are too low. The primary compounds in bones are nano-sized Ca-P, titled hydroxyapatites; therefore, it is possible to produce Ca-P nanoparticles directly from bone waste.

Supercritical water, using only water as the medium, is a green method and has many special chemical and physical properties. Here, we firstly proposed a hydrothermal method to produce Ca-P nanoparticles directly from bone wastes in supercritical water. XRD test is used to confirm the crystal structure of the obtained Ca-P nanoparticles.

## 2. 実験(Experimental)

### 【利用した主な装置】

薄膜 X 線回折装置 RIGAKU ATX-G

### 【実験方法】

In a typical experiment, the bone waste after cooking was filled into an autoclave and mixed with

water. Then the supercritical water treatments were performed at 300~380 °C and 10~30 MPa for 1~8 h.

## 3. 結果と考察(Results and Discussion)

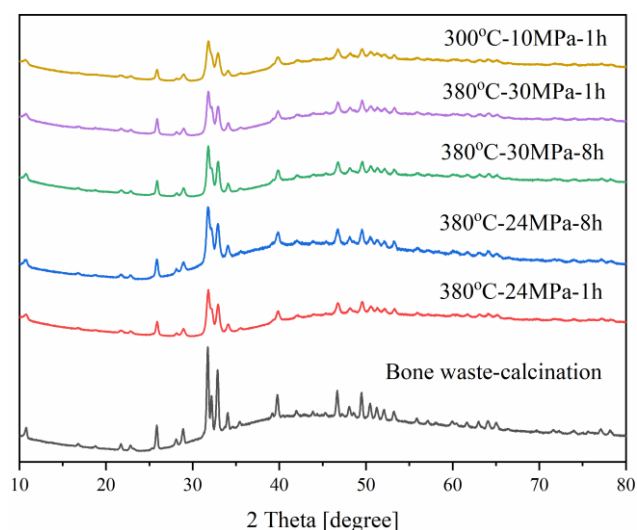


Fig. 1 XRD pattern of Ca-P particles.

Fig. 1 shows the XRD results of the bone wastes after calcination or supercritical water treatments at different temperatures and pressures at different times. This data indicates that all the products are Ca-P particles.

## 4. その他・特記事項(Others)

・参考文献:

- [1] N. Eliaz, *et al.*, Materials, 10, (2017), 334.
- [2] Y. Hong, *et al.*, Materials Science and Engineering: R: Reports, 70, (2010), 225.
- [3] E. Cascarosa, *et al.*, Renewable and Sustainable Energy Reviews, 16, (2012), 942.

## 5. 論文・学会発表(Publication/Presentation)

なし。

## 6. 関連特許(Patent)

なし。