2nd Annual Conference and Expo on Biomaterials

# Production of Bone Tissue Support Materials Based on Bioactive Glass-Polymer Composites

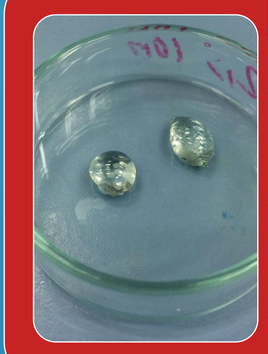
**Ali Can ÖZARSLAN[1], Sevil YÜCEL[1], Oğuzhan GÜNDÜZ[2]**
[1]Yildiz Technical University, Turkey
[1]Marmara University, Turkey

## INTRODUCTION

Bone tissue support materials have biocompatibility, biodegradability and bioactivity properties that are made of various ceramics, polymers or both of ceramics and polymers which is called composites. The most interesting of them is bioactive glasses due to their excellent features. Bioactive glasses are osteoconductive and osteoinductive materials and when they implanted on bone, they connect to the bone tissue. They are generally used in order to fill bone defect and promote new bone formation because of their osteogenic cell stimulator and bioactivity properties. In recent years, bioactive glass materials which are used as bone in the form of block, granules, injectable or paste has increased significantly. These forms which are called support material make easier patient healing and surgical operation.

In this study, injectable bone tissue support materials based on bioactive glass-polymer composites were produced for bone tissue engineering applications. At different ratios of bioactive glass and alginate composites were prepared such as 1:1, 2:1; g:ml, respectively. All samples were characterized by Fourier Transform Infrared Spectroscopy (FT-IR) analysis before simulated body fluid (SBF) to understand structure of composites and after SBF to understand bioactivity properties of composites.

## EXPERIMENTAL METOD



### Production of bioactive glass

- Mixing of Ca, Na, P, Si precursors
- Melt-quenching at high temperature (1450°C)
- Annealing at 550°C

### Production of bone tissue support material

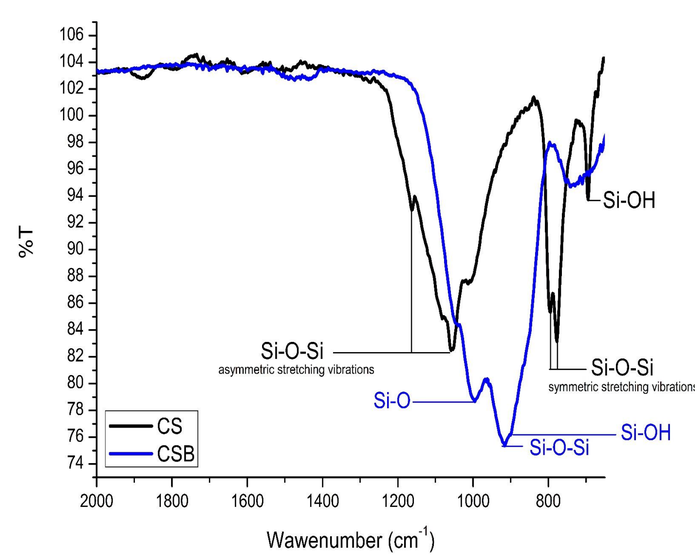
- Preparation of bioactive glass powder
- Preparation of 7.5% alginate solution
- Preparation of injectable putty; bioactive glass-alginate slurry in different ratio

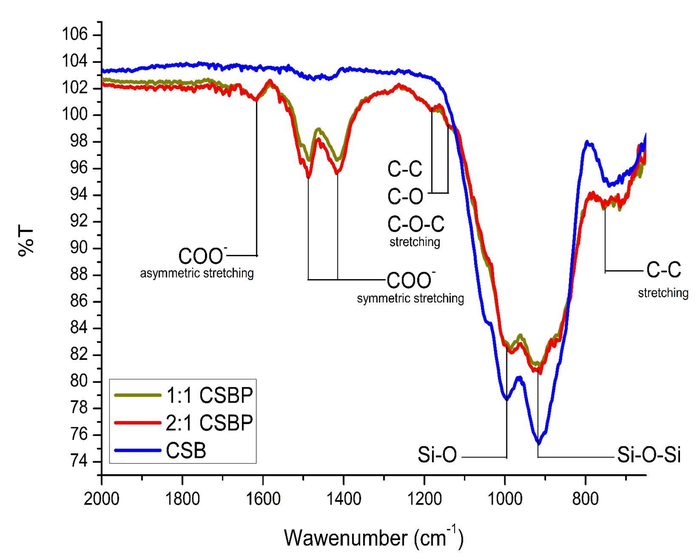
## CONCLUCION

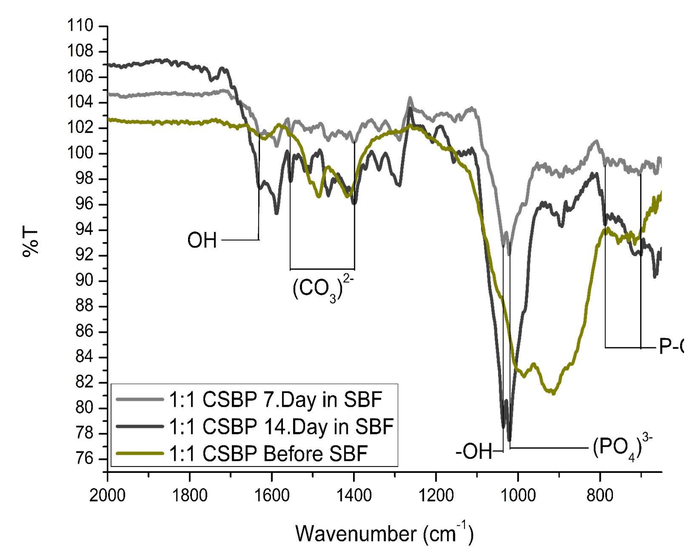
Bone tissue support materials which made of bioactive glass-alginate composites were successfully produced. Density of produced bioactive glass is compatible with literature. According to FT-IR results, bioactive glass-alginate injectable putty (CSBP) samples exhibit high bioactivity behavior (HCA-hydroxycarbonate apatite and HA-hydroxyapatite formations in surface) after SBF incubation for 7 and 14 days. This study shows that bioactive glass-alginate composites are candidate for bone tissue engineering applications as a bone tissue support material.

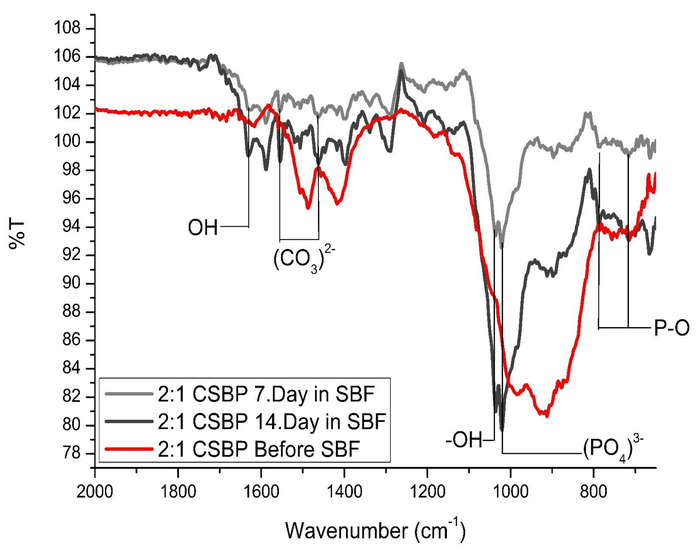
## RESULTS

| | Surface Area ($m^2/g$) | Density ($g/cm^3$) |
|---|---|---|
| CSB (Commercial Silica Based Bioactive Glass) | 4,77 | 2,73 |




**Abbreviations:**
**CS: Commercial Silica**
**CSB: Commercial Silica Based Bioactive Glass**
**1:1 CSBP: Bioactive Glass-Alginate Injectable Putty (bioactive glass:alginate ratio; 1:1; g:ml)**
**2:1 CSBP: Bioactive Glass-Alginate Injectable Putty (bioactive glass:alginate ratio; 2:1; g:ml)**

## Biography

Ali Can Özarslan completed bachelor degree at Yildiz Technical University, department of bioengineering in 2015. He continues his education as a graduate student at Yildiz Technical University, department of bioengineering. He has 2 research paper published by the international refereed journals and 5 papers published by the international scientific meetings. Topics of his interest are bone tissue engineering, biomaterials, bone tissue support materials.

Email: alicanozarslan@gmail.com