

유동상 코팅공정을 이용한 금속 중공체 제조

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금속 다공체는 자동차, 선박, 건축 등의 분야에서 구조물이나 충격흡수제 등으로 응용되고 있는데 이들은 일반 금속 구조물에 비해 가볍고 플라스틱에비해서는 강한 장점을 지닌다. 현재 사용되고 있는 대부분의 금속 다공체는 발포 주조공정으로 제조된 알루미늄으로서, 철계 합금에 비해 가벼운 장점을 갖지만 강도가 상당히 떨어지고 가격이 높은 단점을 가진다. 따라서 본 연구에서는 알루미늄 대신 철계 합금으로 다공체를 제조하고자 하였고 제조방법으로는 주조공정 대신 분말공정을선택하였다. 분말공정은 구형 스티로폼을 금속분말 슬러리로 코팅한 후 스티로폼을 제거하여 날개의 금속중공체(Metallic Hollow Sphere)를 제조하고 이렇게 제조된 중공체를 뭉쳐 성형함으로써최종 형상의 다공체를 제조하는 방법이다. 이 방법으로 제조된 다공체는 주조공정으로 제조된 다공체보다높은 강도를 나타내며 날개의 중공체는 성형공정을 거치지 않고 필터나 충전재 등의 새로운 용도로 활용될 수 있다.

Keywords: 금속다공체, 중공체

Fabrication of Porous Ceramic Materials for Biomedical and Environmental Applications

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Ceramics have some properties that are unmatched by other kind of materials like metals or polymers. The ability of high thermal and chemical resistance and in case of being superior in specific mechanical properties makes the ceramic materials suitable for a range of applications. The microstructure and morphology of a material arguably permit the use of many advanced applications otherwise difficult to achieve. Porous structures have some important applications in biomedical and environmental fields. For human hard tissue reconstruction and augmentation procedure suitable biomaterials are used with a desirable porosity. A range of porous bioceramics were fabricated with tailored design to meet the demand of specific applications. Channeled and interconnected porosity was introduced in alumina, zirconia, and hydroxyapatite or tri calcium phosphate ceramics by different methods like multi-pass extrusion process, bubble formation in viscous slurry, slurry dripping in immiscible liquid, sponge replica method etc. The detailed microstructural and morphological investigations were carried out to establish the unique features of each method and the developed systems. For environmental filters the porous structures were also very important. We investigated a range of channeled and randomly porous silicon based ceramic composites to enhance the material stability and filtration efficiency by taking advantage of the material chemistry of the element. Detailed microstructural and mechanical characterizations were carried out for the fabricated porous filtration systems.

Keywords: Porous structure, bio-ceramics, filtration, structural ceramics, bone reconstruction