In recent years the development of porous metal materials for metal implants can be described in terms of considerable to breakthrough, and our experiment used the TiMo alloy which have very biological activity and low elastic modulus as a starting blueprint and used the method of the removing space holder to make porous TiMo scaffolds. Because the ammonium bicarbonate (NH₄HCO₃) has a characteristics which is low melting point so it's easily to removal at low temperature, as a result of selecting it as the pore-forming agent. At experimental begining, we try to ball milling Ti and Mo element powders to get homogeneous, and after ball milling to t9, we observed the powders which have homogeneous by the backscattered electrons microscopy, so used this group to make the TiMo porous scaffold, but the results show that the compressive strength is extremely vulnerable due to the titanium metal powder ball milled at atmospheric environment has a oxidation of 45 wt%, which led it can't has a well sinterability, so follow-up of this trial will be non-ball milling Ti and Mo powders to made porous scaffold by the blended elemental method. In this experiment, we used different amount of pore-forming agent to make porous scaffolds which were 40, 50, 60, 70 and 80 vol%, as we know, the compressive strength will be declining with increasing porosity, so coordinate the results of the compressive strength, we choosed the dosage of 60% of the porous TiMo scaffolds for the follow-up application of surface modification, because it's compressive strength was 127 MPa and elastic modulus was 4.21 GPa, which were fitted to applied for cortical bone implant materials. In order to investigate the impact of holes for the apatite formation, so we used a solid TiMo as a control group. After the surface modification (alkali and alkaline treatment) , we found that the sample surface had a network structure conformation. After analysis by high resolution X-ray diffraction (high resolution X-ray diffractometer, HR-XRD), it had showed a sodium titanate hydrogel layer (Na₂Ti₆O₁₃), and the results of soaking in the simulated body fluids (simulated body fluid, SBF) 14 days, it had showed the alkali and alkaline treatment of the porous TiMo had been covered with apatite inside the holes, but the size of the apatite of alkali treatment had large more. Until 21 days, no matters the porous inside and outside that the apatite were be covered, but the solids were still had no good result. And we didn't find the apatite formation on the porous TiMo which were no any treatments after 21 days.

Keywords: Powder metallurgy, Porous titanium, Mechanical properties, Surface modification, Simulated body fluid (SBF)
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