

Pengaruh Komposisi Molibdenum-Niobium pada Zirkonium untuk Aplikasi Biomaterial melalui Proses Metalurgi Serbuk = Effect of Molybdenum-Niobium in Zirconium Alloys for Biomaterial Application by Powder Metallurgy Process

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Abstrak

[ABSTRAK

Skripsi ini membahas mengenai pengaruh penambahan unsur Molibdenum-Niobium yang seimbang (berdasarkan persentase masa) pada paduan Zirkonium, untuk diaplikasikan di biomaterial, terutama material tulang buatan. Proses dilakukan dengan metalurgi serbuk, dimana pengujian terdiri dari uji densitas, XRD, uji kekerasan, uji SBF, dan struktur mikro (OM dan SEM). Penambahan Molibdenum dan Niobium pada paduan Zirkonium, berfungsi untuk meningkatkan sifat mekanis, dimana kedua unsur tersebut tidak mengganggu sistem pada tubuh. Hasil optimal ditunjukkan oleh sampel Zr-5Mo-5Nb, dimana Zr-5Mo-5Nb memiliki densitas dan porositas yang optimal, serta kekerasan yang diperoleh menyerupai tulang buatan Ti-6Al-4V, yaitu 38.1 HRC. Ketiga sampel memiliki struktur mikro yang serupa berbeda dan memiliki bioaktivitas yang baik dengan terbentuknya lapisan hidroksiapatit pada permukaan sampel.

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ABSTRACT

The focus of this study is to investigate the effect of adding Molybdenum-Niobium element equally (based on weight percentage) in Zirconium alloys, for biomaterial application, especially for artificial bone. The process is base on powder metallurgy, which testing consist of density test, XRD, hardness test, SBF test, and microstructure test (OM and SEM). The purpose to adding Molybdenum and Niobium to Zirconium alloys, is to increase mechanical properties, without being harmful to human body. Zr-5Mo-5Nb sample is the optimum composition base on density and porosity, and also the hardness is similar to Ti-6Al-4V, which is 38.1 HRC. All of samples have similar microstructure and good bioactivity properties by forming hydroxyapatite layer on the surface of samples.;The focus of this study is to investigate the effect of adding Molybdenum-Niobium element equally (based on weight percentage) in Zirconium alloys, for biomaterial application, especially for artificial bone. The process is base on powder metallurgy, which testing consist of density test, XRD, hardness test, SBF test, and microstructure test (OM and SEM). The purpose to adding Molybdenum and Niobium to Zirconium alloys, is to increase mechanical properties, without being harmful to human body. Zr-5Mo-5Nb sample is the optimum composition base on density and porosity, and also the hardness is similar to Ti-6Al-4V, which is 38.1 HRC. All of samples have similar microstructure and good bioactivity properties by forming hydroxyapatite layer on the surface of samples., The focus of this study is to investigate the effect of adding Molybdenum-Niobium element equally (based on weight percentage) in Zirconium alloys, for biomaterial application, especially for artificial bone. The process is base on powder metallurgy, which testing consist of density test, XRD, hardness test, SBF test, and microstructure test (OM and SEM). The purpose to adding Molybdenum and Niobium to Zirconium alloys, is to increase mechanical properties, without being harmful to human body. Zr-5Mo-5Nb sample is the optimum composition base on density and porosity, and also the hardness is similar to Ti-6Al-4V, which is 38.1 HRC. All of samples have

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