

Thesis Title	Effect of Niobium on Structures and Mechanical Properties of Titanium Alloys
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Candidate	Ms. Thitiwarada Khanchanasing
Thesis Advisors	Asst. Prof. Dr. Siriporn Rojananan Asst. Prof. Dr. Surasit Rojananan
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### Abstract

The aim of this thesis is to study the effect of niobium on microstructures and mechanical properties of titanium alloys. In the experiment, ingots of Ti-12.5Mo-nNb (n= 0, 5, 10, 15 and 20) alloys were prepared using an argon arc melting. The microstructures, microhardness, crystal structures and chemical compositions of the ingots were characterized. Ti-12.5Mo-(5, 20)Nb alloys were heat treated by solution treatment at the temperature of 850 °C, subsequently, aging at 600 °C for 2-8 hours. The experimental results showed that all alloys contained a single  $\beta$  phase. The microhardness were reduced with increasing Nb content. The as-rolled Ti-12.5Mo-5Nb alloy showed the highest tensile strength and the lowest Young's modulus. After solution treatment followed by aging at 600°C, microstructures and mechanical properties were modified. In summary, Ti-12.5Mo-20Nb alloy after aging at 600 °C for 6 hours showed the optimal ultimate tensile strength and elastic modulus which were possible to be a candidate material for biomedical applications. Its strength to modulus ratio is also higher than that of pure Ti and Ti-6Al-4V alloy which are still widely used biomaterials.

**Keywords:** Heat treatment/ Modulus/ Structure/ Titanium Alloys