

快报

## 磁控溅射沉积含He纳米晶钛膜制备

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**摘要** 采用直流磁控溅射方法, 通过分别改变衬底温度及He分压来制备不同氦含量的钛膜。利用PBS、XR D、TEM及AFM分别对钛膜中的He含量、平均晶粒尺寸及膜的表面形貌进行分析。结果表明: 在不同温度范围内, 温度变化对所制备钛膜中He含量的影响明显不同; He含量与晶粒尺寸直接相关, 氦原子进入钛膜后, 抑制了晶粒的长大; 随着钛膜中He与Ti的原子个数比由1.0%增加到11.9%, TEM测得的平均晶粒尺寸由约35 nm减小到约4 nm; 选择合适的He分压, 能够制备出He含量较高的氦钛膜。

**关键词** [磁控溅射](#); [氦含量](#); [氦钛膜](#); [平均晶粒尺寸](#)

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## Preparation of Helium-Charged Nanocrystalline Titanium Films Deposited by Magnetron Sputtering

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### Preparation of Helium-Charged Nanocrystalline Titanium Films Deposited by Magnetron Sputtering

**Abstract** Using direct current magnetron sputtering, He-Ti films with different He contents were prepared with various substrate temperatures and the helium contents in sputter gas. The helium content in Ti films, the average crystal sizes and the surface character of Ti films were analyzed by PBS, XRD, TEM and AFM. The effect of temperature on the He content in Ti films is related to the temperature scope. The He content is directly related to average crystal size and the crystal size is restricted when helium charges into the Ti films. The average crystal size decreases from about 35 nm to about 4 nm when the He/Ti atoms ratio in Ti films increases from 1.0% to 11.9%. The He-Ti films with higher He content can be prepared by choosing the appropriate helium-content in sputter gas.

**Key words** [magnetron sputtering](#) \_ [helium content](#) \_ [He-Ti film](#) \_ [average crystal size](#)

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