A Novel Method for TiN Thin Film Deposition for Next-Generation Electron Source Photocathodes

Tuesday 17 September 2024 15:30 (1 hour)

Titanium Nitride (TiN) has recently garnered much interest as a potential photocathodic material with superior properties to conventional materials [1]. TiN thin films can be grown on various substrates using magnetron sputtering or vapour deposition techniques. However, these require an existing sputter target or powder of high-quality TiN. This study presents a molecular beam epitaxy approach to TiN thin film growth, developing a method of TiN deposition via reactive ion beam sputtering. Ti and TiN thin films were grown on Cu, SiO2 and Si substrates and are characterised using AFM, XPS and low magnification light microscopy. The geometry of the deposition chamber and its effect on uniformity and quality of the growth product is also discussed. XPS analysis confirms the presence of TiN on the surface via the shifted N 1s peak. This crystalline thin-film of TiN shows promise as a protective over-layer for next-generation photocathodic materials which are more sensitive to atmospheric poisoning than the previous generation.

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