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Preparation of Os and W targets by pulsed laser deposition (PLD) for nuclear astrophysics experiments

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The present research study focuses on the preparation and characterization of Os and W targets dedicated to nuclear astrophysics experiments. In general, this type of experiments requires very smooth targets in a pure metal form, without points or wrinkles and with extremly-precised thicknesses.
These materials possess very high vaporization temperatures and as a consequence the preparation of good quality Os and W targets using physical vapor deposition (PVD) techniques is very difficult. To overcome the limitations of PVD methods, pulsed lased deposition (PLD) is one of the most popular technique that allows preparation of thin films of a wide range of materials with high density, thickness uniformity on the defined surface, controllable thickness, high purity and durability [1].
In this context, several Os and W targets with different thicknesses (1-2μm) on 20μm aluminum backing were prepared using PLD technique. The most important target's characteristics (thickness, chemical purity and surface morphology) are further established through alpha transmission measurements, XRD (X-ray diffraction), SEM/EDX (Scanning Electron Microscopy/Energy Dispersive X-ray) and Atomic Force Microscopy (AFM) analyses.
The performances of the obtained targets were tested by alpha activation technique at 9MV Tandem accelerator from "Horia Hulubei-National Institute for Physics and Nuclear Engineering (IFIN-HH, Magurele, Romania), in order to measure the alpha induced reaction cross section of Os and W isotopes.

References:

[1] Pulsed laser deposition of thin films: applications-led growth of functional materials/ edited by Robert Eason, Published by John Wiley & Sons, Inc., Hoboken, New Jersey, 2006.

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