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Surface modification and oxidation of vanadium thin film using femtosecond laser

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A glass substrate vacuum coated with a thin film of vanadium metal with the thickness of 500 nm was treated with a femtosecond laser. The laser was pulsing at a fundamental wavelength of 1050 nm and the repetition rate of 500 kHz, the spot size of the laser on the sample was calculated to be 45 μm . The vanadium coating was then treated with various laser fluences, this resulted in the colouration and surface modification of the sample. From the UV-VIS-NIR study there is an evidence of the formation of the vanadium oxide on the surface of the vanadium thin film, furthermore x-ray diffraction patterns of the samples shows that the microstructure of the film has changed and there are new diffraction peaks emerging that point to the oxidation of the film. The High-Resolution Scanning Electron Microscope of the sample clearly shows the evolution of the morphology of the samples due to laser treatment.

Biography

Lebogang Kotsedi is a National Research Foundation (South Africa) research career award grant holder. He is a research fellow of the UNESCO-UNISA Africa Chair In Nanoscience and Nanotechnology and also member of the NanoAfnetwork. He has a passion for photonics based research, he has recently delved in research space of photonics for sustainable energy and surface modification of transition metals using ultrafast laser. His research seeks to address and find sustainable solution to the national strategic research areas and other key focus areas as outlined by the department of Science and Technology and the renewable energy road map of South Africa.

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