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Thermodynamic stability of VO₂ in contact with thin metal films

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Abstract content
 (Max 300 words)

Solid-state compound phase formation has been investigated between thin metal films (Co, Hf, Ni, Pd and Pt) and VO₂ substrates using Rutherford backscattering spectrometry and X-ray diffraction techniques. The thin-film couples were annealed for time periods ranging from 45 min to 1 h between 400 oC and 900 oC. It was found that Hf reacts with VO₂ whereas Co, Ni, Pd and Pt do not. Heats of reaction were calculated for all possible combinations of vanadium alloy and metal-oxide reaction products. Comparisons with experimental results obtained show in all cases that metal-VO₂ reactions only take place where its calculated heats of reaction were negative. This study shows that the results obtained correlate well with the electronegativity of the metal, which offers a convenient empirical method of predicting whether a metal will react with VO₂ or not. Only metals with a Miedema electronegativity parameter less than 4.9 Volts reacted with VO₂.

Apply to be
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Yes

Level for award
 (Hons, MSc,
 PhD)?

MSc

Main supervisor (name and email)
and his / her institution

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Would you like to
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Yes

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