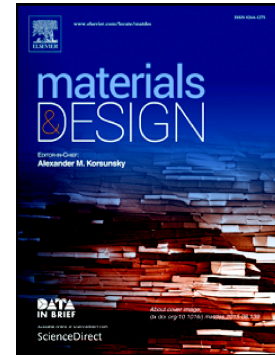


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Bottom-up sandwich-porous copper films: facile construction, growth mechanism, and super-elastic property

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Abstract:

Porous metal film has drawn plenty of attention due to the excellent reliability and potential of integration in current interconnects/electrodes technologies. However, the practical applications of porous metal film have been hampered by complex technique and poor electrical properties. Here, we report a one-step method to directly construct a unique sandwich-porous copper film combining with high mechanical and electrical performance by a simple sputtering process. Growth parameters, with emphases on substrate temperature and deposition time, are systematically investigated to provide direct experimental validation of the formation mechanism of the sandwich-porous films. Results demonstrate that by tuning a porous-factor (β) during the film deposition, it is possible to noticeably affect the surface topography, from columnar to porous and/or dense structure, and hence effectively control the formation of the sandwich-porous structure. Additionally, nanoindentation tests for the sandwich-porous films are also investigated, where high conductivity and

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