

Program

**Nanomechanical Testing in
Materials Research and Development V**

October 4-9, 2015

Albufeira, Portugal

Conference Chair

Dr. Marc Legros
CEMES-CNRS
France



ECI 

Engineering Conference International
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THE MEASUREMENT OF THE ADHESION FORCE BETWEEN CERAMIC PARTICLES AND METAL MATRIX IN CERAMIC REINFORCED-METAL MATRIX COMPOSITES

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This paper presents the method for measurement of the adhesion force and fracture strength of the interface between ceramic particles and metal matrix in ceramic reinforced-metal matrix composites. Three samples with the following Cu to Al₂O₃ ratio (in vol.%) were prepared: 98.0Cu/2.0Al₂O₃, 95.0Cu/5.0Al₂O₃ and 90Cu/10Al₂O₃. Furthermore, microwires which contain a few ceramic particles were produced by means of electro etching. The microwires with clearly exposed interface were tested with use of the microtensile tester (Fig. 1). The microtensile tester consists of two stages, to which two endings of the microwire are fixed. The first stage is able to measure force with the precision equal to 0.1 mN. The microwires usually break exactly at the interface between the metal matrix and ceramic particle. The force and the interface area were carefully measured and then the fracture strength of the interface was determined. The strength of the interface between ceramic particle and metal matrix was equal to 59±8 MPa and 59±11 MPa in the case of 2% and 5% Al₂O₃ to Cu ratio, respectively. On the other hand, it was significantly lower (38±5 MPa) for the wires made of composite with 10% Al₂O₃.

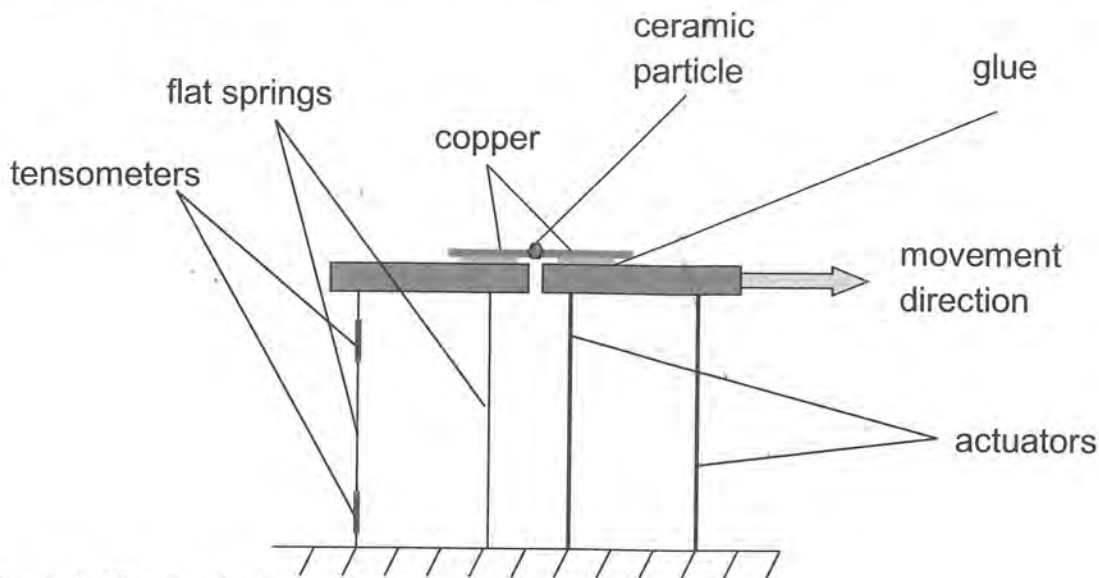


Figure 1. Microtensile tester scheme.