

Surface pre-treatments to improve joint strength of ceramics

Milena Salvo^{1*}, Valentina Casalegno¹, Monica Ferraris¹, Manuela Suess², Christian Wilhelmi², Matteo Pedroni³, and Espedito Vassallo³

1 Department of Applied Science and Technology (DISAT) Politecnico di Torino, Torino, Italy.

2 Airbus Defence and Space GmbH, Space Systems, Mechanical Products and Engineering GE, D-88039 Friedrichshafen, Germany

3 CNR, Istituto di Fisica del Plasma, 20125 Milano, Italy

*corresponding author: milena.salvo@polito.it

The full exploitation by the aerospace industry of the attractive and unique properties of ceramics and ceramic composites calls for effective joining technologies that may help to assemble them in complex shapes or to combine them with metallic parts forming hybrid structures. Surface pre-treatments are widely recognized as one of the key steps to producing robust and reliable bonds.

Surface pre-treatments, using advanced techniques such as laser nano-structuring and plasma etching on SiC and Si₃N₄ will be discussed. Pre-treated joined samples showed a higher mechanical strength than the reference value (lapped surfaces). Some reference and laser-treated similar and dissimilar joints were submitted to a severe cryo-cycling test (from room temperature to 50 K), and it was found that exposure at these extremely low temperatures did not affect the mechanical integrity of the joints.

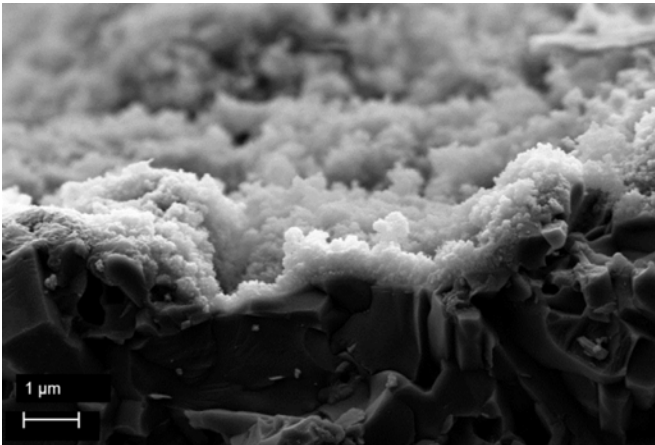


Figure 1. SEM micrograph showing the lateral view of as fired Si₃N₄ after a laser surface treatment [1].

[1] M. Salvo, V. Casalegno, M. Suess, L. Gozzelino, C. Wilhelmi, *Ceramics International*, 44 (2018) 12081.