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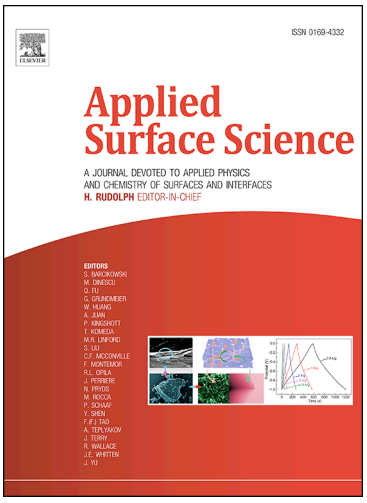


Full Length Article

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# On formation of Al-O-C bonds at aluminum/polyamide joint interface

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## Abstract

Strong dissimilar materials joints consisting of aluminum alloy and polyamide 66 (PA66) plates were produced by a new joining method: friction lap welding (FLW). To understand the key joining mechanism, special samples were made by evaporation of aluminum oxide onto PA66 plates to form an aluminum alloy/PA66 interface. X-ray photoelectron spectroscopy (XPS) was used for characterizing the resulting interfacial chemistry in these aluminum alloy/PA66 samples. Both the Al2p and C1s spectra of XPS confirmed the formation of Al-O-C bonds at the interface between PA66 and alumina coating. Approximately 23.6% of the Al atoms in the 0.8 nm alumina coating have contributed to the formation of Al-O-C bonds. The carbonyl group at the PA66 surface played an essential role in the formation of such an Al-O-C bond. The formation of Al-O-C bonds was proved to be a key factor for achieving good joint strengths in such metal/polymer joints, providing a direct understanding why aluminum alloys can be directly welded to PA66 plates with superior joint strength.

**Keyword:** Polyamide/nylon; aluminum alloys; dissimilar materials joining; joining mechanism; X-ray photoelectron spectroscopy; Friction stir welding.

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