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Abstract: Short carbon fiber reinforced poly-ether-ether-ketone (SCF/PEEK) and 2060-T8 aluminum alloy (AA2060-T8) were joined via friction stir welding with co-controlling shape and performance. The high-quality surface integrity and joint formation were acquired based on a tapered thread pin with the triple facets, a stationary shoulder and a new lap configuration of the SCF/PEEK and the AA2060-T8 at the upper and lower sides. An intimate contact formed at the AA2060-T8 and the SCF/PEEK interface. The macro/micro-mechanical interlocking and the chemical bond attributed to the main bonding mechanisms. Decreasing heat input was beneficial to eliminating the welding defects and improving the load bearing of the joint. The maximum tensile shear strength was 33 MPa. This work indicates that friction stir welding with co-controlling shape and performance has the feasible and potential to join thermoplastic and metal.

Keywords: Joints/joining; Polymer-matrix composites (PMCs); Hybrid; Mechanical properties.

1. Introduction

Global trends in CO_2 emission and gas price have attracted extensive attentions from