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## Effect of galvanic coupling on the corrosion susceptibility of friction stir weldment of AA2198-T851 alloy

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The AA2198-T851 alloy is a new generation Al-Li alloy which finds application in the aerospace industry. Its preference over conventional Al alloys is premised on the fact that it exhibits better strength to weight ratio and improved fatigue resistance due to the addition of Li as a major alloying element. However, it is a relatively new alloy and its processing-structure-property-performance relationship is far from being established. This is very true for the relationship between its structure and corrosion resistance which is very scarce in the literature. Our recent findings have revealed that this alloy is highly susceptible to severe localized corrosion which is caused by the abundance of active hexagonal T1 (Al2CuLi) particles in its microstructure. The corrosion susceptibility is further promoted by the non-uniform precipitation of these particles which are often preferentially concentrated in bands aligned parallel to the {111}Al. Furthermore, bulk zonal heterogenities with pronounced non-uniform distribution of the active T1 particles are created when this alloy is welded using friction stir welding. The friction stir welding process is a solid state welding process that has been adjudged to be the best welding technique for Al alloys. Nonetheless, this process generates different zones in the weldments of Al alloys. Thus, zones exhibiting different electrochemical characteristics and severe galvanic interactions can occur when the weldment is exposed to a corrosive media. The galvanic interactions can lead to a faster propagation of attack in the most susceptible region of the weldment, which in this case is the parent material (with the highest volume fraction of the T1 particles). To establish this, the galvanic interactions between the zones of the weldment have been investigated by separately exposing the parent material and the stir zone of the weld and then by exposing the entire weldment using NaCl and EXCO solutions. Optical, scanning electron and transmission electron microscopes were also employed in the study. The results revealed that the parent material of the weldment was the most susceptible (as previously mentioned) and appeared to corrode at a faster rate when coupled to the more cathodic stir zone, thermomechanically affected zone and the heat affected zones of the weldment (with lower volume fraction of the T1 particles). The modes of corrosion in the zones of the weld were also observed to be different. However, the most susceptible region corroded intragranularly with the grain boundaries exhibiting more noble electrochemical characteristics.