

## Editorial

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The ability to join materials to form tools, devices and structures has been vital to the survival and progression of mankind. It is thought to be one of the first manufacturing technologies. With time the need for joining has not abated, as traditional and new materials have to be joined together in assemblies, structures and devices to achieve function. Joining technology on the macro, micro and nanoscale is employed in applications such as in bridges, next generation aircraft, micro-electro-mechanical-system (MEMS) and biomaterial implants.

With the demand to improve and enhance these, Joining Science and Technology (JST) has emerged as an enabling key technology.

This special section presents a number of papers related to metal–metal and metal–ceramic joining that are representative of current commercial and applied research focus in JST.

The first two papers look at metal–metal joining by two different welding techniques.

Friction stir welding (FSW) was developed for joining aluminium and its alloys, and is of great interest to the aerospace and maritime sector. The given paper looks at

local melting and tool slippage during the FSW process in a number of different Al-alloys. The effects of varied process parameters are investigated with regards to the final weld microstructure and properties.

Hydrogen embrittlement in steel and its welds is an area that continues to be investigated due to the potential catastrophic results if failure was to occur. The microstructural effects of hydrogen embrittlement susceptibility in a HT780 class steel is investigated. The effect of multi-pass metal active gas (MAG) welding on the fracture surface microstructure is investigated.

The final paper looks at metal–ceramic joining by active brazing.

Active brazing has become the favoured metal–ceramic joining technique, where reliable, permanent and hermetic joining is achieved. The given paper looks at joining stainless steel to yttria-stabilised zirconia (YSZ) for possible fuel cell applications.

The aim of this special section is to touch upon some of the main joining techniques that are commercially employed and touch our everyday lives.

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