

Thermodynamic Databases for Lead Free Solders

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ABSTRACT

Because of European legislation, lead will no longer be used in the fabrication of most electrical and electronic materials within Europe. COST 531 was a very successful European action on the study of new lead-free materials suitable for replacing the so-called “electrician solder” with a freezing temperature of 183°C.

Another class of solders, so called high temperature solders, were exempt from current European legislation on the removal of lead because there were no obvious viable alternatives.

Existing high temperature materials could contain as much as 85wt% Pb, melting over a range of temperatures from 250 and 350°C and are required for a variety of advanced technologies including under bonnet applications. In order for these current alloys to be replaced by new high-temperature lead-free solders a good understanding of the melting behaviour is paramount.

A new European COST Action MP0602 ‘HISOLD’ was created to address this and other issues concerned with high temperature replacement solders.

As with COST531 one of the key aims of the MP0602 collaborative project was the development of a database containing critically assessed thermodynamic data. Such a database was to be used as a guide in order to select compositions of alloys of potential use for high temperature solders and also to provide a fundamental basis for understanding the formation of the intermetallics at the interface between a substrate and a solder.

The presentation will be concerned with the choice of potential