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A Eutectic Alloy for Lead-free Soldering

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The main solder which has to be replaced in the move to lead-free, “63/37”, is of approximately eutectic composition and, importantly, behaves like a eutectic in commercial production soldering. It can be inferred from the fact that the electronics industry migrated to this alloy from the traditional “60/40 despite the cost of an extra 3% of the more expensive constituent of the alloy that a eutectic offers some significant advantages. Of the alloys being widely considered as lead-free solders three eutectics have attracted most attention, Sn-Cu, Sn-Ag and Sn-Ag-Cu with the last of these finding most favour, probably because of its relatively low melting point (217°C). Although initially recommended for wave soldering the Sn-Cu eutectic alloy proved to be difficult to use in practice. The problem appears to be that despite its nominal eutectic composition it does not behave like a eutectic during production soldering. In this paper the modification of the solidification of Sn-0.7Cu by a trace addition of nickel to achieve true eutectic behaviour is reported and the benefits that accrue therefrom outlined.