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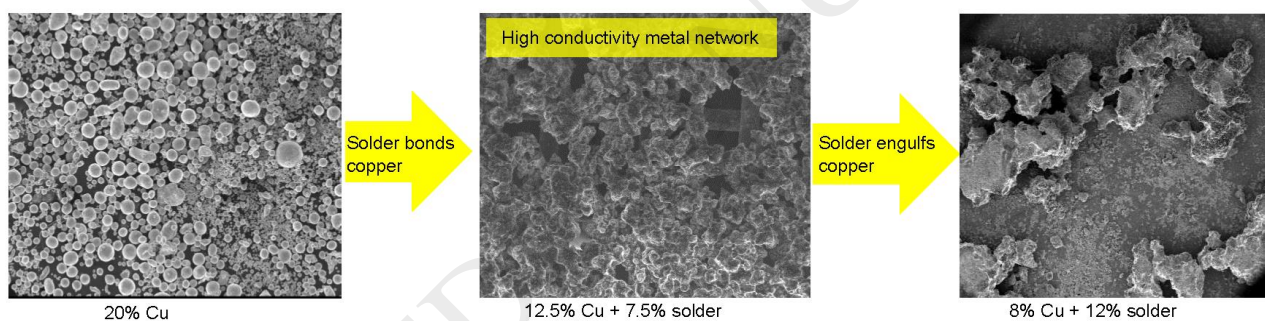
# Bulk Soldering: Conductive Polymer Composites filled with copper particles and solder

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Graphical abstract



Abstract

The electrical conductivity of plastics can be improved by metal filler particles, but high metal loadings (several ten volume percent) are generally needed to realize percolating pathways that can conduct electricity. We explore the improvement of the electrical conductivity of polystyrene by simultaneously adding two different metal fillers: copper particles, and a lead/tin solder alloy. The essential idea is that during mixing, the solder can bind together the particles via numerous menisci and the resulting copper-solder aggregates can then form a percolating network – hence the term “bulk soldering”. We show that this approach can realize high conductivities at total metal loadings that are far lower than if the copper particles were used as the sole conductive filler. SEM confirms that the microstructure consists of copper particles bonded by the solder, and that such

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