

## The use of Cu-based shape memory alloys as pipe couplers

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The coupling of tubes of different materials as steel and ceramics, aluminum and Teflon, etc., is needed in several applications. Because the different physical and chemical properties of the different materials, it is frequently not possible to promote the coupling by welding or brazing. One possible solution for this problem would be the use of mechanical couplers. A shape memory alloy (SMA) stands out as a possible mechanical coupling, since they exhibit the shape memory effect (SME). The SME allows the recovering of the initial shape after plastic deformation by means of structural transformation during heating. Actually, the NiTi-based SMA have been used as couplers but these alloys are expensive and are difficult to process. A candidate to replace this material are the Cu-based SMA, which exhibit better thermal and electrical conductivity, have lower cost and are easier to process. The aim of this work is to investigate the use of SMA as tube couplers, more specifically to study the viability to replace the TiNi SMA by Cu-based alloys in this application. The Ti<sub>50</sub>Ni<sub>50</sub> (at. %) and Cu<sub>81.9</sub>Al<sub>11.85</sub>Ni<sub>3.2</sub>Mn<sub>3</sub> (wt.%) alloys were produced in arc melter and characterized by X-ray diffraction (XRD), differential scanning calorimetry (DSC), optical microscopy (OM) and scanning electron microscopy (SEM). Ingots were cut to the shape of rings, which were deformed in order to increase the diameter 3 and 5%. The deformed rings were used to couple steel rods. The group (rods + deformed ring) were heated above the structural transformation temperature in a vacuum furnace to allow for the coupling. Their phase formation, microstructure, thermal stability and efficiency as a coupler will be discussed during this presentation.