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M1Or1C-06: Minor titanium addition enables novel copper-tantalum composite microstructures

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We investigated the microstructures achievable by severe plastic deformation processing of copper-tantalum powder composites with a Ta volume fraction ranging from 0.25 to 0.75 by sintering. Additional composites of the same tantalum content were prepared with a minor addition of titanium, added to facilitate interphase bonding. The sintered composites were extruded via several ECAE routes, and the resulting microstructures characterized by scanning electron microscopy (SEM) and hardness and tensile testing. The Ti modification was found to markedly improve the strength and extrudability of the composite allowing fabrication of copper-tantalum composites with novel microstructures. The Ti addition apparently causes solid solution softening of the Ta phase and enables the Cu and Ta phase regions to uniformly co-deform.

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