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High electric conductivity and optimum strength in cold-drawn CuCrZr alloys at 295K and 77K

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We achieved both high electric conductivity and optimum strength in Cu-0.54Cr-0.046Zr alloy (wt%), and firstly characterized their properties at cryogenic temperature, which was comparable to those of Al60 both at 295K and 77K. Ordered clustering of solute atoms was revealed to be uniformly distributed in solution-treated samples. During deformation, those clusters became the heterogenous nucleation sites for precipitates growing in 2-D layer structure. 2-D layered precipitation had no evident influence on improving the conductivity. Aging treatment led to precipitates growing in 3-D particle shape. And due to the size in a couple of nanometer, aging-induced particle most maintained a coherency relationship with matrix. 3-D clustering had a relative high Cr (1~8 wt%) content, and played a crucial role on doubling the conductivity.

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