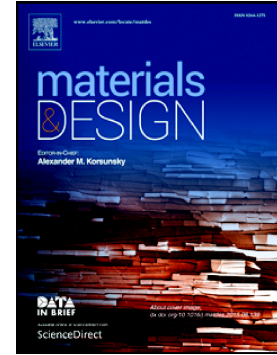


## Accepted Manuscript

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PII: S0264-1275(17)30651-2  
DOI: doi: [10.1016/j.matdes.2017.06.062](https://doi.org/10.1016/j.matdes.2017.06.062)  
Reference: JMADE 3180  
To appear in: *Materials & Design*  
Received date: 23 February 2017  
Revised date: 23 June 2017  
Accepted date: 27 June 2017

Please cite this article as: J.P. Hou, Q. Wang, Z.J. Zhang, Y.Z. Tian, X.M. Wu, H.J. Yang, X.W. Li, Z.F. Zhang , Nano-scale precipitates: The key to high strength and high conductivity in Al alloy wire, *Materials & Design* (2017), doi: [10.1016/j.matdes.2017.06.062](https://doi.org/10.1016/j.matdes.2017.06.062)

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# Nano-scale precipitates: The key to high strength and high conductivity in Al alloy wire

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## Abstract

Outstanding mechanical and conductive properties are vital to Al alloys used as overhead conductors. However, high strength and high electrical conductivity are usually mutually exclusive in metallic materials. In this study, we present a novel method to achieve high strength and high conductivity in an Al-Mg-Si conductor. Numerous dispersive nano-scale precipitates were obtained using an artificial aging treatment for a 6201RE Al alloy conductor. The precipitation of the alloying elements in the form of nano-scale precipitates is determined to play a strengthening role, decreasing the concentration of alloying elements in the matrix and reduce lattice distortion such that high strength (352.3 MPa) and high electrical conductivity (56.0 %IACS) are achieved simultaneously in a 6201RE Al alloy. High strength and enhanced electrical conductivity could be achieved by introducing the nano-scale precipitates in the Al alloy. Finally, the strengthening mechanisms and the electrical

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