

Accepted Manuscript

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PII: S0261-3069(14)00822-X

DOI: <http://dx.doi.org/10.1016/j.matdes.2014.10.034>

Reference: JMAD 6893

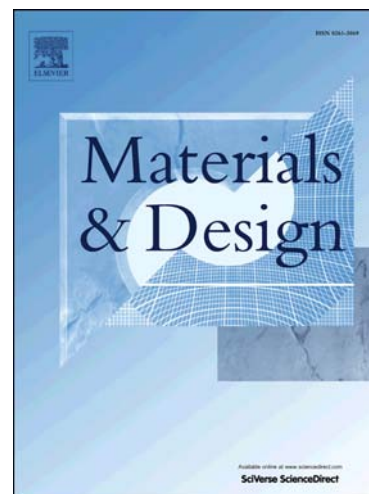
To appear in: *Materials and Design*

Received Date: 25 June 2014

Accepted Date: 14 October 2014

Please cite this article as: Xiaohua, C., Zidong, W., Ding, D., Hao, T., Lili, Q., Xiang, L., Guodong, S., Strengthening and toughening strategies for tin bronze alloy through fabricating in-situ nanostructured grains, *Materials and Design* (2014), doi: <http://dx.doi.org/10.1016/j.matdes.2014.10.034>

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**Strengthening and toughening strategies for tin bronze alloy through
fabricating in-situ nanostructured grains**

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Abstract: A trend of strengthening accompanied by a loss of ductility is generally true for metals and alloys processed in various methods for hundreds years. In the future, increasing the strength of metals and alloys without sacrificing other properties including ductility is critical for their competitiveness. Successful strategies of simultaneously strengthening and toughening for copper alloys were presented. Taking cast Cu-10Sn-2Zn-1.5Fe alloy (weight percent) for example, which had improved tensile strength of 483MPa, and dramatic uniform elongation of 29.3%, respectively, at room temperature, in contrast to conventional cast Cu-10Sn-2Zn tin bronze alloy. It was proved that the strategies originated mainly from refined and nanostructured grains of in-situ tin bronze nanocomposite fabricated by adding minor iron and solidifying under convective condition, with large number of semi-coherent iron-rich nanoparticles (an average size of 2-10nm) embedded in a micrometer-sized grain with size of 20-60 μ m. Besides the refined and nanostructured grains, the

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