

ABSTRACT (suppressed*)

Synthesis of a nanostructured heavy alloy with ultra high performance through metastabilization of the equilibrium phases

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The project has as a material of reference the system of Cu-W and the aim was to find a way to improve upon the conventional values of hardness, strength and toughness.

Industrial applications of the system are quite diverse, but the work has focused exclusively on applications where the Cu-W can be used as a heat sink or as armor-piercing ammunition.

Although the peculiarity of the system focuses on the fact that copper and tungsten do not show miscibility, this simplified to some extent to study of the system as it was possible to study each component separately.

The thorough review and analysis of individual components through the available information led to the isolation of all those elements which even though appeared to characterize each component independently, their controlled combination at the nanosynthetic level did enable the structuring of the system in a completely different way than the conventional one.

In this way not only we managed to overcome the immiscibility but also to achieve at least at the theoretical level the bulk atomic mixing the two components.

However the synthesis of a heavy particulate alloy is not enough to give the requisite industrial significance to the finished product.

For this reason and since the experimental aspect of the proposed methodology could not be realized, as the set up of the laboratory is still in progress, a decision was made to further investigate the possibility of forming the alloy in a way that will enable the transposition or integration of the as-synthesized material in a sample of predetermined size. Associated partner in this effort was the Fraunhofer Institute for Manufacturing and Advanced Materials in Dresden Germany.

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