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Science and Technology of Mechanical Alloying and Milling: Study Cases

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ABSTRACT:

Within the Powder metallurgy, to make the powder is one of the most important stages because it will determine its size, shape, microstructures and composition, having a strong influence in the properties of the final products. In the decade of the 60s, in the research laboratories of the International Nickel Company (INCO), J.S. Benjamin developed an entire new field of possibilities for the milling in Powder Metallurgy; a process called Mechanical Alloying. In the first applications, this process was used to combine the advantages of the solid solution reinforcement with precipitation and dispersion of oxides reinforcement, but that was only the beginning. In the early 70s, INCO manufactured a commercial alloy using this process, INCONEL MA754. Today, the areas of application of this process can be varied and they have shown to be successful in the obtaining of many materials that have not been developed using other techniques. Examples of this, is the obtaining of numerous saturated solid solutions, intermetallic compound and amorphous materials. In this work, study cases and research results will be described in order to show and compare different procedures.

BIOGRAPHY:

Since 2010 Paula Rojas has been the Research Director in the Office of the Vice President for Research and Graduate Programs at the Catholic University at Valparaiso (PUCV), Chile. She establishes research policy and assists nine colleges at PUCV in research matters. The nine colleges that fall under her responsibility include Agricultural Sciences, Architecture and Planning, Sciences, Economics and Administration, Law Philosophy and Education, Engineering, Natural Resources, and Theology. Paula Rojas is a Full Professor in the Department of Mechanical Engineering, where she has been since 2008. Prior to that she was a Post-Doc for four years in the Physics Institute at PUCV, where she worked on developing Copper-lithium alloys and conductive polymers. In 2004 she was a Post-Doc in the College of Engineering at University of California Davis. While there she worked on developing nanocrystalline titanium-based alloys. Paula Rojas current interests include fabrication process (mechanical alloying processes to create compounds, supersaturated solutions and metallic glasses) and applications of materials (atmospheric corrosion and its effects on material´s mechanical properties in extreme environmental conditions). She has published 25 archival papers and over 50 conference proceedings. In 2003 Paula Rojas received her Doctor of Sciences in Materials Engineering from University of Santiago, Chile.

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