WATERLOO | ENGINEERING
MECHANICAL AND MECHATRONICS ENGINEERING

seminar series

The Quantitative Analysis of Metastable Solidified Structures

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Most metallic materials are produced from their liquid state. In order to control the properties of industrial products, it is therefore very important to understand their solidification route and the resulting microstructures which can be significantly affected by melt undercooling. High undercooling results in rapid solidification and a refined microstructure with minimal microsegregation. This seminar will outline the analysis developed for rapidly solidified Al-Cu and D2 tool steel droplets obtained by Impulse Atomization. A quantitative analysis by Rietveld refinement method of the Neutrons Diffraction data was carried out to determine the fraction of the intermetallics. Knowing these quantities corresponding dendritic and eutectic undercoolings were estimated using the metastable extensions of solidus and liquidus lines of the Al-Cu system calculated by Thermo-Calc. A microsegregation model developed for rapid solidification conditions will be used to verify the undercooling analysis. The implications of these findings will be addressed in terms of important factors to consider in rapidly solidification processes.

DATE: **Friday, July 18, 2014**

TIME: **10:30 a.m. to 11:30 a.m.**

ROOM: **E5 3052**

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Professor Hani Henein earned a B.Eng. and an MEng. in Metallurgical Engineering (1972 and 1976 respectively) from McGill University. In 1981, he received his Ph.D. from the University of British Columbia and joined the faculty at Carnegie-Mellon University, Pittsburgh, PA and then the University of Alberta (1989). Professor Henein has held senior leadership positions in AIST (formerly ISS) and TMS. With the MetSoc of CIM, He served as Editor of the Canadian Metallurgical Quarterly and as the 1998-99 President. Professor Henein presently is the 2014 TMS President.