MM 32: HV Gandin

Time: Thursday 10:15–10:45 Location: IFW A

Invited Talk MM 32.1 Thu 10:15 IFW A

Direct simulation of in-situ real time X-ray solidification experiment — •Charles-André Gandin[1], Guillaume Reinhart[2], Nathalie Mangelinck-Noël[2], Henri Nguyen-Thi[2], Bernard Billia[2], and José Baruchel[3] — [1]MINES ParisTech, CEMEF CNRS 7635, Sophia Antipolis, F — [2]Aix-Marseille Université, IM2NP CNRS 6242, Marseille, F — [3]ESRF, Grenoble, F

In most metallic alloys, solidifying grains are made of a mixture of a dendritic solid, s, plus an interdendritic liquid, d. The grain envelope is delimited by the dendrite tips that grow in an extradendritic liquid, l. Due to segregation of solutal elements between the solid and liquid, the composition of the liquids are different. Mass exchange takes place between these liquids by diffusion and thermosolutal convection, leading to segregation patterns between the grains. Upon cooling, solidification ends with the formation of a eutectic structure. A model is presented to simulate the development of such structures and segregation patterns. A directional solidification experiment using Al - Ni is also presented. It is based on in-situ real time X-Ray imaging performed at the European Synchrotron Radiation Facility. While the dendritic grain structure and the eutectic front are resolved, access to the liquid flow is not possible and the composition field can so far only be qualitatively observed. The presentation will show how the use of the model can be conducted to help understanding the formation of the dendritic and eutectic structures by a direct simulation of the liquid flow and its interaction with the growing solid phases.