Dr Leandro Bolzoni (WaiCAM)
Co-Winner of the Charles Hatchett Award

The 12th of July 2016, Dr. Leandro Bolzoni from the School of Engineering and WaiCAM (Waikato Centre for Advanced Materials) received, jointly with his former colleagues from Brunel University London Dr. Hari Babu Nadendla and Dr. Magdalena Nowak, a prestigious international award from IOM^3, the Institute of Materials, Minerals and Mining.

The Charles Hatchett award is given to the most outstanding paper on the metallurgy and processing of niobium (Nb) and its alloys. The award is named after Charles Hatchett (FRS), the English scientist who discover the metal in 1801, and is sponsored by the Companhia Brasileira de Metalurgia e Mineração (CBMM) and managed by Beta Technology Ltd.

From left to right: Dr. Hari-Babu Nadendla, Dr. Magdalena Nowak, IOM^3 President Mike Hicks, and Dr. Leandro Bolzoni.

Award-winning papers are likely to have made a significant contribution to metallurgical knowledge, and the results of the research should have the potential to make a major technical, technological, commercial, environmental or other sustainability-related impact on important industrial sectors. The award-winning papers that Dr. Leandro Bolzoni co-authored focused on the development of efficient and reliable grain refiners for cast Al-Si alloys, which constitutes 90% of all the cast aluminium alloys. Specifically, the innovative composition was designed using thermodynamics and crystallographic databases and is based on using Nb-based phases as potent heterogeneous substrates for the nucleation of aluminium. The work awarded is titled “Grain Refinement of Al-Si Alloys by Nb-B Inoculation” and considers both theoretical (Part I: Concept Development and Effect on Binary Alloys) and industrial relevant (Part II: Application to Commercial Alloys) aspects of the refinement of Al-Si alloy in order to achieve more uniform and enhance performances of cast products. Specifically, Part I presents a systematic series of experiments to determine the most effective type of addition and optimum composition. For high Si alloys, the Nb-B additions give far more effective grain refinement than conventional Ti-based additions. Part II investigates the application of Nb-B inoculation to a range of commercial Al-Si alloys. It is found that Nb-B inoculation refines both the primary Al dendrites and the secondary eutectic Si phase. From the experimental work it is evinced that Nb-B inoculation makes the final grain size less dependent on cooling rate, and hence casting method, leading to more uniform properties in casting with complex geometries. The award-winning papers were discussed during the “Niobium for Aluminium Cast Parts in Automotive Components” seminar held at the British Royal Society of Chemistry in London on the 13th of July. The seminar focused on the potential impact that the application of the newly developed Nb-based grain refiners for cast Al-Si alloys would have on the automotive sector. Representative from the whole production chain, from raw materials suppliers to automotive end-users, contributed to the seminar. It is clear that the automotive industry is struggling to fulfil the

more stringent regulations about greenhouse emission and a way to satisfy them would be to reduce the weight of the car, reduction which could be achieved by optimised Al-Si alloys inoculated with Nb-B grain refiners.

Late last year, in October 2015 Dr. Leandro Bolzoni and his former colleagues from Brunel University London also received the Innovation award from the Cast Metals Federation for the work performed on the development of Nb-based grain refiners. The award is given to a company or partnership of companies, educational institution and/or research body that, through technical or new product innovation, have taken the UK cast metals industry forward.