Plenary Lecture

Title	Prof.	First Name	Chang-Jiu	Last Name	Li
Affiliation			Xi'an Jiaotong University		
Presentation Title			The strategy of microstructure control towards the advanced applications of thermal spray ceramic coating based on the critical bonding temperature concept		
Biography			Prof. Chang-Jiu Li received his B. Sc from Mechanical Department of Xi'an Jiaotong University at 1982, Master degree and Ph.D of Engineering from Osaka University (Japan) in 1986 and 1989. From 1989 to 1992, he worked as Research fellow in Kinki Advanced Materials Processing Institute, Japan. Since December 1992 he works as full professor in Xi'an Jiaotong University. From 1983, he began his career of study on thermal spraying. His research interests include the coating formation mechanisms such as splat formation and lamellar interface bonding, coating microstructure development, coating microstructure design for high performance applications to wear resistant coatings, corrosion-resistant coatings, TBCs, SOFCs, ASSIB (All Solid State Ion Battery). He has published about 800 technical papers, including over 475 papers in the peer-reviewed international journals, 110 papers in Chinese journal and over 230 papers in the conference proceedings. From 2012, he serves as an associate editor of the Journal of Thermal Spray Technology. In 2017, he was selected as ASM Fellow. In 2019, he was inducted to ASM Thermal Spray Fame of Hall.		

Abstract	**Plasma spraying has been well developed for variety of industrial applications. It is well known that thermal spray ceramic coatings present a lamellar structure with limited lamellar interface bonding, which degrades the mechanical and physical performances of the coatings significantly and consequently limits the development of coating materials potential. In this present, the intrinsic critical bonding temperature for spreading ceramic droplet to form a bonding with previous splats will be presented, which is defined as the glass transition temperature of ceramic coating material. Accordingly, a critical deposition temperature for splat to form a bonding at the interface in terms of the critical bonding temperature is proposed. When the deposition temperature exceeds the critical bonding temperature a thermal spray ceramic coating with sufficiently bonded splats chemically is achieved, otherwise the coatings of conventional lamellar structure are deposited instead. It will be shown that based on the concept of the critical bonding temperature, the ceramic coatings with different microstructures from a fully dense one to porous ones with different pore geometries can be created to fulfill different service requirements for advanced applications such as for wear-resistant coatings, highly durable thermal barrier coatings, energy storage device and high performance SOFC manufacturing. It will be also shown that with the ceramic materials of a melting point lower than about 1500oC the coatings of fully dense microstructure can be deposited at ambient temperature which allows the possibility to extend ceramic coatings to further wider functional applications in different fields.**