Bangalore Chapter

ASM International Bengaluru Chapter

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ASM Online Technical Talk

Titled

"Advances in Thermal Barrier Coatings and Refractories from Aluminum Dross (an industrial waste): Materials Processes, Systems and Prospects"

BY

Dr. Parvati Ramaswamy

Professor, Department of Mechanical & Automobile Engineering,
School of Engineering & Technology, CHRIST (Deemed to be University),
Bangalore Kengeri Campus, Mysore Road-560 074

Date & Time: 09.05.2020, Saturday at 5:00 pm

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Mr. Rahul Masurekar
Chairman ASM (I),

Dr.Nataraj J R
Secretary ASM (I),

Address: ASM (I) Bangalore Chapter
C/o ACE Carbonitriders
A-145, 3rd Cross, 1st Stage, Peenya Industrial Area, Bangalore-58
Telephone: 080-2839 5888/2839; E-mail : asmblr2015@gmail.com

Advances in Thermal Barrier Coatings and Refractories from Aluminum Dross (an industrial waste): Materials Processes, Systems and Prospects

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This presentation deals with two different aspects of current materials research. The first one is related with ceramic coatings, especially plasma sprayed ceramic Thermal Barrier Coatings (TBCs) used for protecting metal and other aerospace components (e.g. gas turbine engines) serving under high temperature (>1000°C) environments. An overview of the conventional state-of-the-art 8%- yttria stabilized zirconia (8YSZ) TBCs, novel configurations such as Functionally Graded Materials (FGM), scope for research involving newer ceramic compositions, spray dried plasma sprayable powders, nano-zirconia coatings, benefits of using Residual Stresses Analysis (a non-destructive method) to assess the condition of TBCs, and other supporting materials characterization methods will be touched upon.

The second technology involves utilization of Aluminum dross, an industrial waste, challenges being faced due to landfilling, and the potential to synthesize refractory materials comprised of oxides of aluminum (Al_2O_3) and magnesium ($MgAl_2O_4$) in an environment friendly manner (removal of hazardous nitrides (AlN) and chlorides etc.). Refractories are widely used for structural applications in severe environments where more efficient use of energy is a prime need. Owing to properties such as high strength and refractoriness, and low thermal expansion these materials may find varied applications (e.g tundish boards) in the industries. The refractories also experience extreme mechanical, thermal and chemical loading conditions and are expected to perform effectively beyond existing limits that can be extended via coating technology, but with a technically and economically viable approach. Thus there remains a critical need to develop a suitable and reliable refractory coating system and coating technique.

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