

Editorial

JTST Special Issue on “Coatings for Energy Applications”



Armelle Vardelle



Robert Vassen

The supply of energy at affordable prices is a key-requisite for all modern societies. Especially electricity plays a dominant role and has to be produced in an efficient and environmentally friendly way. With the proven, detrimental impact of increasing human CO₂ emissions on the climate world-wide activities have been initiated to reduce these emissions by energy conversion processes with improved efficiency or by avoiding them using renewable energy sources as wind, water, sun light, or biomass.

Looking at the world-wide energy consumption the conventional sources of coal, oil and natural are dominant, with more than 65% of the global consumption.^{1,2} Nuclear sources contribute about 13% and the renewables are close to 20%. Scenarios for the development within the next 40 years project that the fossil fuel sources will still grow and hence remain to be important. However, the fraction of renewable energy sources will increase appreciably.

To meet the projected increased demand of electricity, it is essential to improve efficiencies of all energy generation processes and this includes the development of better materials, operation at higher temperatures, improved corrosion resistance, electricity storage capacity, and electrochemical or catalytic performance. These specific materials properties are often attained by means of advanced coatings. Here the thermal spray technology offers a variety of different processes such as plasma, high velocity oxy fuel, or suspension spraying, which allow the design of innovative and highly effective coatings at affordable prices.

Such thermal spray coatings with its unique properties are of high potential use for several energy systems. A number of these applications will be addressed in this volume. The applications include boilers, components of gas and steam turbines and steam power plants, and other systems where temperature and corrosion resistant coatings play an important role. Thermal spray coatings will also be necessary in novel energy generation systems, such as fusion reactors, solid oxide fuel cells, hydrolysers, and devices for the capture of solar energy.

The response to the open call for contributions for this issue has shown a strong interest by the community in the above topic as nearly 100 abstracts have been submitted to the Journal. Therefore, a first selection of abstracts had to be made with obvious emphasis on the use of thermal spray coatings in energy generation systems.

The series of papers to be published in this special issue will not cover the subject in its entirety and potential contributions on other, equally exciting subjects, may be missing. However, the Editors believe that the papers presented in this special issue provide an excellent overview of important existing applications and ongoing developments in this area. Clearly, the number of different topics covered in this issue shows the importance of thermal spray coatings in the energy arena and the potential for expanding the market for thermal spraying.

In closing, we would like to thank all the authors who submitted abstracts and papers and the nearly sixty reviewers who provided high-quality, diligent reviews.

Guest Editors

Armelle Vardelle
Université de Limoges,
Limoges, France

Robert Vassen
Forschungszentrum Jülich GmbH,
Jülich, Germany

¹U.S. Energy Information Administration (EIA) Report DOE/ EIA-0484 (2011).

²International Energy Agency (IEA) World Energy Outlook 2012.