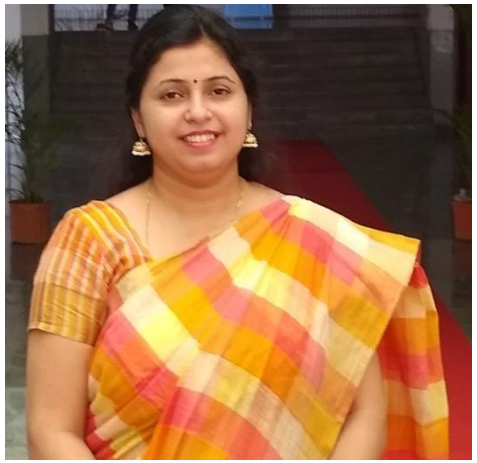
The Indian Institute of Metals
(Mumbai Chapter)
(Incorporating Bombay Metallurgical Society)

IIM Mumbai Chapter Executive Committee cordially invites you to its
Evening Lecture Series

Liquid Metal Technology for the development of Nuclear Fusion Reactor



Dr. P. Chakraborty
Materials Science Division
Bhabha Atomic Research Centre

Date: August 26, 2020 (Wednesday)
Time: 1900 h
Through Webinar

Dr. P. Chakraborty

Dr. Poulami Chakraborty is a lead materials engineer in the Advanced Nuclear Reactor Program and is involved in the development of structural materials for Gen-IV reactors, like, Fusion Reactor and Molten Salt Reactor. Her major contributions include evaluation of corrosion performance of the Indian Reduced Activation Ferritic-Martensitic Steel (IN RAFMS) in Pb-Li, demonstration of the effect of operating parameters on the corrosion process and search on novel methods to mitigate the same. Her research has brought a paradigm shift in the understanding of Liquid Metal Corrosion of RAFM steels, where the role of surface oxides in altering the mechanism of Pb-Li attack has been well illustrated. In addition, she has successfully developed natural and forced circulation Pb-Li loops in the presence of magnetic field for liquid metal compatibility studies.

Recipient of

- Gold Medal from NIT Durgapur and Homi Bhabha Award from BARC
- Young Engineer Award from the Indian National Academy of Engineering (INAE).
- Young Engineer Award from the Department of Atomic Energy (DAE) and the DAE Group Achievement Award.

Liquid Metal Technology for the development of Nuclear Fusion Reactor

The International Thermonuclear Experimental Reactor (ITER) is an international research and engineering project which is currently building the world's largest experimental Tokamak at France where India is one of the key partner. India has proposed the Lead Lithium Ceramic Breeder TBM where the eutectic Pb-Li alloy will be used as the coolant, tritium breeder and neutron multiplier. However, one of the key challenges towards the successful demonstration is the choice of structural material. Considering the extensive damage capacity of high energy fusion neutrons (14 MeV) a special steel, Indian RAFMS have been developed in terms of synthesis, fabrication and joining methodology. However, detailed corrosion mechanism of RAFM steels in Pb-Li is still an unexplored territory. Keeping this gap in mind, a comprehensive program was initiated at Bhabha Atomic Research Center, Mumbai for establishing the detailed corrosion mechanism of IN RAFMS in Pb-Li by developing various liquid metal test facilities. Based on extensive characterization of the exposed samples, liquid metal corrosion of RAFM steels has been established. The talk will give a concise overview of the first hand development of various liquid metal technologies and the salient results of liquid metal corrosion obtained in Pb-Li.

The Indian Institute of Metals
(Mumbai Chapter)
(Incorporating Bombay Metallurgical Society)

IIM Mumbai Chapter Executive Committee cordially invites you to its
Evening Lecture Series

Aqueous corrosion of metals and alloys: forms of corrosion and its mitigation

Dr. S. Roychaudhary
Materials Processing and Corrosion Engineering Division
Bhabha Atomic Research Centre

Date: August 27, 2020 (Thursday)
Time: 1900 h
Through Webinar

Dr. S. Roychowdhury

Dr. Supratik Roychowdhury is working as scientific officer in Materials Processing & Corrosion Engineering Division, BARC since 1998. He completed B.E. (Metallurgical Engg.) from REC, Rourkela (presently NIT, Rourkela), M.Tech. (Materials Science) and PhD (Corrosion Science & Engineering) from IIT Bombay. He was awarded the Marie Curie research grant (COFUND scheme) for pursuing post-doctoral research in Paul Scherrer institute (PSI), Switzerland (2013-2015).His primary research interest is corrosion/SCC of nuclear structural materials in simulated nuclear reactor water chemistry (SCC initiation and growth), hydrogen embrittlement, flow-accelerated corrosion, providing metallurgical support (failure analysis, material selection) and delivering lectures on corrosion related topics. In recognition to his work he has received the “Best M.Tech thesis award” and “Excellence in corrosion science and technology” from NACE International India Section, Best PhD thesis award from IIT Bombay, Mumbai, DAE individual and group awards and has number of publications in peer reviewed journal

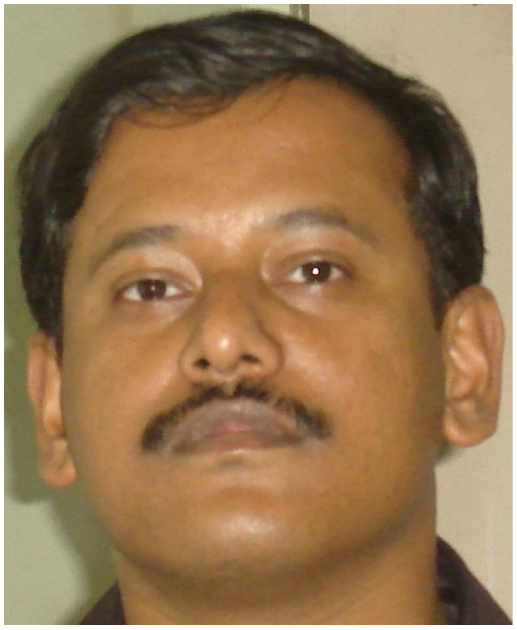
Aqueous corrosion of metals and alloys: forms of corrosion and its mitigation

Corrosion has plagued humankind resulting in the loss of valuable metals and alloys since the beginning of the metal age dating back to 6000 years. The origin of the word corrosion is the latin word “corredere” meaning “to gnaw away” which occurs due to an interaction of metals and alloys with its environment over a period of time. Though terms such as “spoiled metal” has been used in the first century AD to describe metal loss due to corrosion however, a formal inquest into this process began in the 19thcentury.Corrosion results in a direct cost which accounts for 1-5% of a nations GDP and an equal proportion accounts for the indirect cost. A thorough understanding of the basics of corrosion, mechanisms is essential and will help in devising mitigation methods which will reduce the cost of corrosion. This presentation will focus on basics of corrosion principles and will highlight the different forms of corrosion occurring in metals and alloys exposed to an aqueous environment, typical metal-environment combination which lowers corrosion, rule of thumb for choosing materials for common environments found industrially. Common mitigation methods adopted to control corrosion will be covered in the presentation. However, a one-size-fits-all approach to control corrosion is frought with errors since a mitigation method controlling one form of corrosion can easily lead to failure by another form of corrosion. Common errors in design, during operation, material handling, fabrication etc. which can lead to potential failures due to corrosion will be focussed upon

The Indian Institute of Metals
(Mumbai Chapter)
(Incorporating Bombay Metallurgical Society)

IIM Mumbai Chapter Executive Committee cordially invites you to its
Evening Lecture Series

Finding U!



Dr. P. Sengupta
Materials Science Division
Bhabha Atomic Research Centre

Date: August 28, 2020 (Friday)
Time: 1900 h
Through Webinar

Dr. P. Sengupta

Dr.Pranesh Sengupta is presently working in Materials Science Division, Bhabha Atomic Research Centre, Mumbai and a Faculty (Engineering Discipline) of Homi Bhabha National Institute. His research interest is to address the materials based issues at the back end of the nuclear fuel cycle which includes dealing with mineralogy, natural analogue study, glass, glass ceramics and alloys. Dr. Sengupta is an alumnus of Jadavpur University, Kolkata, Fellow – Alexander von Humboldt Foundation, Germany and Member of Indian Institute of Metals, Electron Microscopy Society of India, Materials Research Society of India, Materials Research Society America, American Ceramic Society, Mineralogical Society of America. Dr.Pranesh Sengupta is also presently serving as Chief Scientific Investigator for IAEA Co-ordinated Research Project ‘INWARD’.

Finding U!

U, Uranium which although became popular with its extraction in the form of uranium oxide powder form naturally occurring mineral pitchblende about 230 years ago by a German scientist Martin Klaporth but it was a familiar “unknown black powder material” to the craftsman involved in making decorative glasses way back in ‘before Christian era’. Following Klaporth, J Arvedson (Sweden) could prepare brown colored U_3O_8 and finally Eugene Peligot (France) who could successfully extract metallic U powder in 1841. It was another French Scientist, Henri Moissan who first produced the U ingot in 1896, and received Noble Prize. Around the same time, Antoine Becquerel (France) discovered the radioactive properties of uranium salts (1891) was probably the first recipient of Noble Prize in the field related to Uranium science and Technology. Uranium therefore remained as a very attractive topic to the then scientists, technologists and craftsmen, and many milestones were achieved in after the other and they were recognized Noble Prize Awarding committees (Physics, Chemistry) as well. It was around middle of the past century when the exciting term ‘uranium’ earned the name of ‘element of disagreement’ with the atomic explosions in Japan.

Post World War II, Homi Jehangir Bhabha (1909-1966), could once again revive the past glory of uranium under the international initiative ‘atom for peace’ and formulated International Atomic Energy Agency. Over the past half a century, uranium has again assumed its creditable position in international arena for various societal and peaceful applications but still the past tag is following it. In the presentation, a brief note on the discovery of uranium and its making as an important element will be discussed and followed by its occurrence within nature, with special emphasis on Indian resources will be shared.

But as it stands today, once again ‘Uranium is neighbour’s envy owner’s pride’!