ONLINE WORKSHOP ON

ADVANCED PLASMA PROCESSING TECHNIQUES FOR INDUSTRIAL CHALLENGES (APTIC)-2021

OCTOBER 20-22, 2021

OFFICIAL ORGANISER

CSIR - Institute of Minerals and Materials Technology
Council of Scientific and Industrial Research (CSIR)
Ministry of Science and Technology, Govt.of India

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ABOUT KARYASHALA & APTIC-2021

'KARYASHALA' is an effort to improve research productivity of promising PG and PhD students from universities and colleges through high-end workshops on specific themes. This program aims to provide opportunities to acquire specialized research skills in Plasma processing which is a promising technology lead and has a huge potential to cater a variety of industries ranging from mineral processing to material development. It can also be used to efficiently process industrial waste materials, prepare surfaces with novel functional capabilities and characteristics for many emerging applications. APTIC-2021 will primarily focus on:

- The fundamentals of plasma processing of materials using both non-thermal and thermal plasma.
- Lectures from experienced scientists which will include the basics of plasma, plasma reactors and mechanisms for the deposition/production of various materials and thin films.
- To provide understanding and insight to PhD and PG students about the practical aspects of plasma processing techniques.
- The discussion sessions will provide a fertile atmosphere for brainstorming and creative thinking among students and scientists to attempt to solve or approach Industrial challenges.

IMPORTANT DATES

Workshop Event :

October 20-22, 2021 9:30am – 5:30pm

Registration closing Date :-

October 15, 2021

Announcement of Final Participants List :

October 18, 2021

LIMITED SEATS AVAILABLE !!!

FIRST COME FIRST SERVE BASIS

ABOUT CSIR-IMMT

CSIR-Institute of Minerals and Materials Technology (IMMT) has expertise in conducting basic research and technology oriented programs in a wide range of subjects to address the R&D problems of mining, mineral and metals industries and ensure their sustainable development.

This online workshop event is being organised by Advanced Materials Technology (AMT) Department of CSIR-IMMT which has plethora of experience in plasma processing techniques as well as boasts of advanced modern plasma research devices. The department has developed a number of plasma processes for smelting, melting and synthesis of carbides, oxides and successfully prepared different metals, ferroalloys and composites. Various processes use ore and minerals, industrial and agricultural wastes, e-wastes, etc. to develop bench scale technology. Significant work have been carried out and pursued in areas of nanomaterials, thin films and green steel.

WHO CAN ATTEND?

PhD research scholars and Master's Students.

TO REGISTER

Open the link http://aptic2021.immt.res.in/ and click on Register Now and follow further instructions.

CONTACT US

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OFFERED PLASMA PROCESSING TECHNIQUES

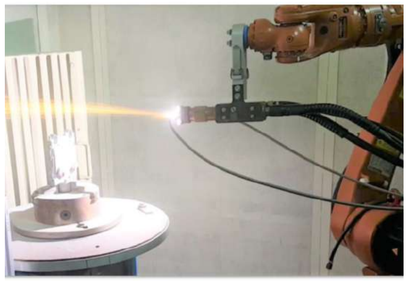
ARC PLASMA

A plasma arc operates on principles similar to an arc-welding machine, where an electrical arc is struck between two electrodes set under under high voltage where high current is allowed to pass to create an high energetic arc plasma discharge under atmospheric conditions. The high-energy arc creates extremely high temperatures ranging from 3,000 degrees to 7,000 degrees Celsius. The plasma arc can be used for several applications including plasma oxidation, treating organic and inorganic wastes, etc.

HYDROGEN PLASMA REDUCTION

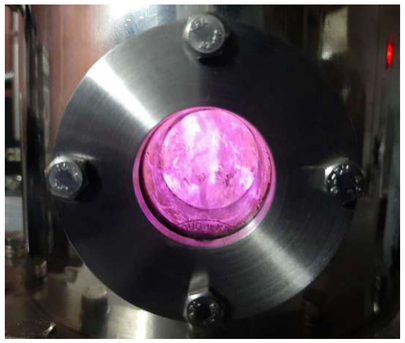
Hydrogen plasma is a special case of arc plasmas where the arc is generated in a controlled vacuum atmosphere where hydrogen is used as the source of plasma. During the hydrogen plasma reduction (HPR), a plasma arc zone is generated between an electrode and the input ore. In this zone, the ore can be melted and reduced by hydrogen in both molecular and plasma states. Hydrogen plasma reduction allows the production of liquid iron in one single step, in which the input fine ores are melted and reduced simultaneously without the need for intermediate agglomeration or refinement processing.

THERMAL PLASMA SPRAY



Plasma spray is a thermal spray coating process, which uses plasma under atmospheric pressure to subject particles under plasma in-flight and deposited as a desired composition on the substrate. This technique is used to produce a high quality coating by a combination of high temperature, high energy heat source, a relatively inert spraying medium, usually argon, and high particle velocities. The great advantage of the plasma spray coating technique is its ability to spray a wide range of materials, from metals to refractory ceramics, on both small and large components offering: corrosion protection, wear resistance, clearance control – abrasives and abradables, heat and oxidation resistance, temperature management and electrical resistivity and conductivity.

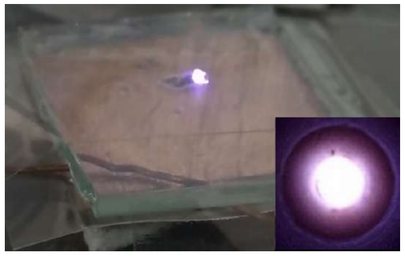
RF/DC SPUTTERING



Sputtering is the process of material removal from a solid surface (called as target) as a consequence of momentum transfer between an energetic particle (usually an ion which comes from the plasma) and the surface of the target. The plasma discharge is achieved in a low pressure environment to achieve sufficient particle momentum to enable elastic collision.

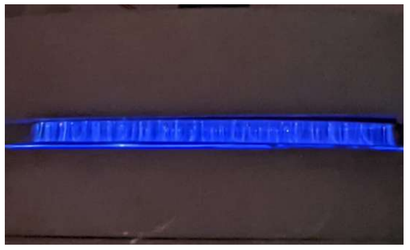
Direct current (DC) Sputtering is a cost effective way of applying metal target coatings that are electrical conductors. The target is subjected to high DC cathodic voltage where the ionized particles from the plasma collide and sputter/knock off the target atoms which will eventually get deposited on the substrate (set as anode). Radio Frequency (RF) Sputtering uses alternating current as a driving force for collision. At radio frequencies charge building up on certain types of sputtering target materials can be avoided.

MICROPLASMA ILLUMINATION



The term "microplasma" usually refers to low-temperature plasma discharges with dimensions that range from a few micrometers up to a few millimetres, which is generated by electrical breakdown of gases upon applying voltage. The plasma discharges generate a highly reactive environment that comprises charged particles, excited species, radicals, and photons, and the reduced dimensions allow low-power sources with small footprints suitable for the combination in microsystems and portable devices.

DBD PLASMA



Dielectric barrier discharges (DBDs) are plasmas generated in configurations with an insulating (dielectric) material placed between the electrodes, where displacive current is generated due to pulsing action of DC or polarity change in AC currents. DBDs are a typical example of non-thermal atmospheric or normal pressure plasma discharges. It is used in a wide range of applications, such as ozone & UV generation, air & wastewater treatment, sterilization of packaging and food, as well as activation, cleaning, etching and coating of surfaces.