

## **Shriram Institute for Industrial Research**

**Delhi Campus:** 19, University Road, Delhi -110007; Email: customercare@shriraminstitute.org **Bengaluru Campus:** 14-15, Sadarmangla Indl. Area, Whitefield Road, Bengaluru - 560048

# SIIR helping Minerals & Metal Industries to strength "Make in India" initiatives

#### **ABOUT SIIR:**

Shriram Institute for Industrial Research (SIIR) is an independent, self-sustaining, not-for-profit multidisciplinary contract research institute conducting research and development in the areas of special significance to industry, government agencies and other organizations. SIIR is committed to develop, innovate, analyze and apply technology for products and processes.

SIIR is operational from Delhi, Gurugram and Bangalore. SIIR's thrust areas are Materials Science, Analytical Science, Life Science, Irradiation of Medical and Surgical products and Quality Assurance. More than 300 Scientists are continuously engaged in Scientific Research diverse and Development at the Institute. For further details about the Institute, you may visit the Institute's website at www.shriraminstitute.org.

#### MINERALS & METALS DIVISION

Metal and Minerals Division (MMD) has capability and competency in the areas of Analytical Activities in various areas i.e. Metals & alloys (Chemical & Mechanical), Minerals & Ores, Inorganic Chemicals & fertilizers etc. Metals & alloys is part of Metals and Mineral Division which undertakes analytical studies for ferrous and nonferrous alloys. i.e. plain carbon steel, Alloy steel, stainless steel & tool steel. Copper & its alloys, Aluminum & its alloys, lead & its alloys, Tin & its alloys, Zinc & its alloys, Nickel & its alloys, Titanium & its alloys, Precious metals, Rare Earth Metals as per national & international standards. The major thrust areas of Metals & alloys includes:



#### (CYCLIC CORROSION TEST CHAMBER)

#### Wet and Spectro-Chemical Analysis:

Division has the facility for wet & spectralchemical analysis of all types of metal & its alloys using Sophisticated Instrumental Techniques i.e. AAS (VGA & GTA), ICP-OES, ICP-MS, IC & SPARK-OES.

#### (A) Metals & Alloys:

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#### Mechanical & Metallurgical Studies:

Study of mechanical properties using UTM, hardness using hardness testers ,Micro hardness tester, metallographic, grain size, phase analysis, presence of inclusion and their ratings, Fractography, impact energy, compressive strength, flexural strength using UTM, Impact tester.

#### **Performance Study and Non-Destructive Analysis:**

Performance study of LPG Stove and Domestic Pressure Cooker, Non-destructive analysis on metal & alloys for identifying cast and process induced internal defects in above-mentioned metal & alloys.

## Measurement of any Type of Coating and Coating Composition:

Division has facility for measurement of metallic and nonmetallic coating on any substrate material i.e. Galvanized, Anodized, Nickel, silver, gold, copper, chromium, ceramic and powder coatings.

#### **Corrosion Studies:**

The lab established Cvclic has the Corrosion Test Chamber facilities for studying the corrosion behavior by natural cyclic climatic conditions for a specific duration on automobile systems. The lab also has facilities to carry out corrosive studies i.e. salt spray test, identifying type of corrosion, corrosion penetration rate, on metallic & non metallic coatings on ferrous & nonferrous alloys.

#### **Failure Studies:**

Our division accomplished a world class Failure Investigation Testing Service. Failure study of Boiler tube successfully is carried out to diagnose the cause of failure using the SEM, SEM-EDX, Spark-OES, Optical metallurgical microscope & provide results with preventative measures. SEM is used for identifying the type of fracture (ductile or brittle) & surface morphology studies.

#### **Migration Studies:**

Migration studies of alloying elements in grades of stainless steel used in food ware have been conducted successfully in our department. Number of alloying elements such as chromium, Nickel, copper and iron etc. were studied using different food simulants (acetic acid, tartaric acid etc.) in varying concentrations. This study was important for the safety parameters of food wares.

#### (B) Mineral & Ores:

Minerals & ores are part of Metals and Mineral Division which undertakes Physico-chemical & mineralogical study of various minerals & ores such as Iron Ore, Limestone, Dolomite, gypsum, Bauxite. Lime. **Bentonite** Quartz, Feldspar, Zirconium ore, Manganese ore, fluorspar, Rock phosphate, Chromite Ore, Barite, China clay etc. MMD has a facility for Physico-chemical analysis of raw materials of cement for quarrying. Analysis of cement & all building materials, glass and ceramics, Refractories, Thermal insulating materials,



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Scale deposits etc.

#### SCANNING ELECTRON MICROSCOPE (SEM)

#### (C) Inorganic Chemicals & Fertilizers:

Inorganic Chemicals & Fertilizers is part of Metals and Mineral Division which undertakes Purity and impurity profile. Physico-chemical properties of acids, base, salt, Pigments, food grade chemicals, disinfectants, water treatment chemicals, Rubber chemicals, and sugar treatment chemicals. The laboratory carries out routine study of Fertilizers (liquid & solid), Micronutrients, Organic fertilizers, City compost, 100% water soluble fertilizers as per latest revision of Fertilizer Control Order (FCO) & Method development & validation of test procedures for non-standard fertilizers.

#### (D) Miscellaneous Activities:

#### Method Development and Validation:

MMD is also involved in new method development and validation to zinc in zinc glycine, Calcium in calcium glycine, Boron in boron glycine fertilizers by atomic absorption Spectrophotometer. The test method was not covered in Fertilizer Control Order 2021.

#### **Third Party Inspection:**

MMD is also involved in third party inspection activities in the areas of Metal and Alloys, Open Air Gym Park Equipment, Refectories material, DI Pipe Inspection,

#### Poly Aluminum Chloride Etc.

#### (E) R & D Activities:

Metals & Minerals Division (MMD) has capability in the areas of research and development in various fields like mineral beneficiation technology, method development validation. and metal nanoparticle based disinfectant. water based metallic emulsion paint and migration studies of metals in food wares etc. Our division is also involved in simulation based failure studies of metal components used in heavy machinery. Our division is continuously working towards developing new and innovative solutions to industrial problems.

## Opportunity for you: SIIR inviting partnerships and research Ideas

All interested parties working in the metal and mineral sector are free to share problems faced by them. Researchers working on various industrial problems can approach SIIR to have joint research projects.



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