Dr. Harpreet Singh Arora, Assistant Professor in the Department of Mechanical Engineering, received Start up-Grant of Rs. **23 Lakhs** under Young Scientist Scheme (Individual centric) from **Science and Engineering Board (SERB), Department of Science and Technology (DST), Government of India** for his proposal titled "***Tailoring the Surface Properties of Crystalline and Amorphous Metals for Advanced Bio-Implants***".

Recently, another proposal on "***Modulating Coating Properties for Enhanced Protection from Erosion-Corrosion: A Systematic Approach on Delineating the Effect of Post-Processing Conditions***" for Rs. **29 Lakhs** has also been awarded to Dr. Arora by **Naval Research Board (NRB)**.

Proposal Summaries:

Increase in human life-expectancy has increased the need for biomedical implants with enhanced properties. However, surface degradation by wear and corrosion cause significant damage to the implant material and shortens its life span. These are also responsible for sudden catastrophic failure of the bio-implant. The wear of the implants during service results in the formation of wear debris, reported to be the major cause for premature failure of hip and knee implants. Stainless Steel (SS) 316L and Ti-based alloys are the most widely used implant materials. A relatively new class of materials, bulk metallic glass (BMG) is promising for different biomedical applications. In contrast to conventional crystalline materials, BMGs have considerably higher hardness, wear and corrosion resistance. Although, BMGs have favorable characteristics for use as bio-implants, tailoring the surface properties of BMGs can be beneficial to further enhance their mechanical, tribological, corrosion and biological properties. In the proposed work, friction stir processing (FSP) will be used to tailor the surface properties of commonly used implant materials i.e. stainless steel, Ti-6Al-4V alloy and bulk metallic glasses. FSP will be done under different processing conditions and its effect on microstructural evolution, mechanical properties and degradation behavior under corrosive and tribological conditions will be investigated. Such studies have not been reported earlier and could be potentially transformative resulting in the development of long-lasting and reliable bio-implants.

The proposal on post-processing of coatings aims to develop superior coatings for marine components which are typically subjected to erosion, corrosion as well as erosion-corrosion environment. The inherent lamellar microstructure of thermal sprayed coatings and presence of splat boundaries, pores and un-melted particles results in anisotropic behavior together with poor mechanical and tribological properties. The study includes development of some novel coating compositions followed by their post-processing using different techniques including microwave sintering, high strain deformation and heat treatment. This will be useful to develop fundamental understanding on the influence of key parameters on the microstructural refinement, mechanical properties as well as structure-property relation of coatings, which is still not well understood.