National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Fabrication of Mo based alloys by powder metallurgy for structural application
Speaker	: Sambit Swain (Rollno : 522mm1004)
Supervisor	: Prof. Anshuman Patra
Venue	: Seminar Room: MM Annex Building
Date and Time	: 19 Jun 2024 (10:30 AM)
Abstract	: In this study, six distinct alloy compositions were synthesized via mechanical alloying: S1 ($Mo_{80}Ni_{10}Si_{10}$), S2 ($Mo_{80}Ni_{10}Co_{10}$), S3 ($Mo_{80}Ni_{10}Si_5Co_5$), S4 ($Mo_{79}Ni_{10}Si_{10}(Y_2O_3)_1$), S5 ($Mo_{79}Ni_{10}Co_{10}(Y_2O_3)_1$), and S6 ($Mo_{79}Ni_{10}Si_5Co_5(Y_2O_3)_1$) (in weight%). These powders were consolidated at 1500 °C for 1.5 h in hydrogen atmosphere. After 20 h of milling, oxide particles were encapsulated within Mo particles. Alloys containing Y_2O_3 exhibited the smallest particle sizes and a bimodal particle size distribution. XRD analysis of sintered samples identifies the presence of hard and brittle intermetallic phases, including Mo_3Si (cubic), Ni_3Si (cubic), and MoNi (orthorhombic). SEM analysis reveals that Y_2O_3 nanoparticles reduce the average grain size of the Mo matrix. Elemental mapping confirms the presence of Y_2O_3 within the Mo matrix in alloys S4 to S6. Sintered alloy S6 achieves the highest relative density of 89.74%. Alloys S2 and S3 exhibit the highest hardness values of 9.08 GPa and 8.85 GPa, respectively, attributed to their significant intermetallic phase formation. Incorporating Y_2O_3 particles improves the wear resistance of the Mo alloys due to oxide dispersion strengthening.