National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Fabrication of Mo based alloys by powder metallurgy for structural application
Speaker	: Mr. Sambit Swain
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Venue	: M.Tech class room (PG Building)
Date and Time	: 19 Jun 2024 (10:30 am)
Abstract	: In this study, six distinct alloy compositions were synthesized via mechanical alloying: S1 (Mo80Ni10Si10), S2 (Mo80Ni10Co10), S3 (Mo80Ni10Si5Co5), S4 (Mo79Ni10Si10(Y2O3)1), S5 (Mo79Ni10Co10(Y2O3)1), and S6 (Mo79Ni10Si5Co5(Y2O3)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 Y2O3 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 Mo3Si (cubic), Ni3Si (cubic), and MoNi (orthorhombic). SEM analysis reveals that Y2O3 nanoparticles reduce the average grain size of the Mo matrix. Elemental mapping confirms the presence of Y2O3 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 Y2O3 particles improves the wear resistance of the Mo alloys due to oxide dispersion strengthening.