

Dr. Malik Adeel Umer

Professor

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Dr. Malik Adeel Umer specializes in **powder metallurgy, cermet coatings, and high-performance composite materials**. His consultancy focuses on **advanced material processing and product development** through powder-based technologies. With extensive experience in indigenous fabrication and performance optimization, he aims to bridge the gap between academic innovation and **scalable industrial implementation**, particularly in **sustainable materials** and **defense-oriented applications**.

Areas of Expertise

- Powder Metallurgy; Powder Processing; Sintering and Densification (PS, LPS, SPS, HP)
- Cermets for cutting tool applications
- Composite coatings for corrosion and wear protection
- Ceramics for ballistic and structural/thermal protection applications
- Metal matrix composites via powder metallurgy route
- Industrial and bio-waste derived materials for engineering applications
- Polymer composites for structural and lightweight applications

Consultancy & Research Capabilities

- **Laboratory Facilities:** Comprehensive powder processing and fabrication setup for metals, ceramics, and composites
- **Core Expertise:** Sintering route optimization, coating development, and high-performance materials processing
- **Notable Projects:**
 - Indigenous fabrication of Al_2O_3 ceramic tiles for ballistic armor
 - Rigid thermal protection systems for reusable space vehicles
 - 3D fabric-reinforced epoxy composites for structural applications

- *Synthesis and characterization of silicon nitride powder*
- *Advanced Ni coatings for aerospace applications*
- *C/C composites with enhanced oxidation resistance for high-temperature environments*
- *Self-healing corrosion protection coatings for 7XXX aluminium alloys*
- *NbC-based cermets for cutting tools and electroplated diamond tools development*
- *Process optimization for diamond-based chamfering tool manufacturing*

Potential Areas for Consultancy

- Industrial waste valorization for sustainable engineering materials
- Bio-derived waste conversion into functional products
- Prototyping and scalable manufacturing of engineered materials and components

Selected Publications

1. *Processing route effects on NbC–Fe–Ni cermets: Improving mechanical properties via mechanical alloying, International Journal of Refractory Metals and Hard Materials.*
2. *Fe–Ni binder modified NbC cermets: A cost-effective solution with superior mechanical properties, Ceramics International.*
3. *Microstructure and mechanical properties of TiC reinforced NbC–Ni₄VC₄Mo₂C cermets, Materials Research Express.*
4. *Exceptional mechanical properties and wear behavior of Al₂O₃ nanoparticle reinforced Ni–WP coatings, Tribology International.*
5. *Interfacial strength enhancement of diffusion-bonded HSLA steel using Be–Cu alloy interlayer, Journal of Materials Engineering and Performance.*

Preferred Modes of Engagement:

- Joint R&D and applied research collaborations
- Prototyping and testing of novel materials
- Product feasibility studies and industrial process establishment

