



भारत सरकार / Government of India  
परमाणु ऊर्जा विभाग / Department of Atomic Energy  
होमी भाभा राष्ट्रीय संस्थान / Homi Bhabha National Institute  
राजा रामन्ना प्रगत प्रौद्योगिकी केन्द्र  
Raja Ramanna Centre for Advanced Technology



## HBNI Faculty Profile

<b>Name</b>	<i>Arun Kumar Rai</i>	
<b>Designation</b>	<i>Assistant Professor</i>	
<b>Research Area</b>	<i>Laser materials processing, Physical metallurgy, Microstructure property correlation, Phase transformation and phase stability Microstructural and phase field evolution</i>	
<b>Research Profile</b>	<i>The research area covers development of different advanced engineering materials using laser additive manufacturing process relevant for nuclear, aerospace, and other industries. Establishment of microstructure and properties correlation through study of microstructural and phase field evolution in laser processed materials using different advanced characterization techniques. Understanding the effect of phase transformation and phase stability on materials properties in as built and post processed materials developed with laser additive manufacturing process. Enhancement of materials properties using laser shock peening through near surface microstructural modification and generation of compressive residual stress.</i>	
<b>Ten Selected Recent Publications</b>		
<b>1.</b>	Yadav, S., Paul, C.P., <b>Rai, A.K.</b> , Singh, R., and Dixit, S.K., <b>2023</b> . Elucidating laser directed energy deposition based additive manufacturing of copper-stainless steel functionally graded material: processing and material behaviour, Journal of Manufacturing Process 92, pp 107-123.	
<b>2.</b>	Bhardwaj, V., <b>Rai, A.K.</b> , Upadhyaya, B.N., Singh, R., Rai S.K., and Bindra, K.S., <b>2022</b> , A Study on effect of heat input on mode of welding, microstructure, and mechanical strength in pulsed laser welding of Zr-2.5 wt.%Nb alloy, Journal of Nuclear Materials 564, 153685.	
<b>3.</b>	Dwivedi, P.K., Vinjamuri, R., <b>Rai, A.K.</b> , Ganesh, P., Ranganathan, K., Bindra, K.S., and Dutta, K., <b>2022</b> , Effect of laser shock peening on ratcheting strain accumulation, fatigue life and bulk texture evolution in HSLA steel, International	



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	Journal of Fatigue 163, 107033.
4.	Muthukumar, G, <b>Rai, A.K.</b> , Gautam, J., Babu, P.D., Ranganathan, K., and Bindra, K.S., <b>2022</b> . A study on effect of multiple laser shock peening on microstructure, residual stress, and mechanical strength of 2.5 Ni-Cr-Mo (EN25) low-alloy steel, Journal of Materials Engineering and Performance
5.	<b>Rai, A.K.</b> , Paul, C.P., Mishra, G.K., Singh, R., Rai, S.K., and Bindra, K.S., <b>2021</b> . , Study of microstructure and wear properties of laser borided Inconel 718 , Journal of Materials Processing Technology 298,117298.
6.	Mishra, G.K., Paul, C.P., <b>Rai, A.K.</b> , Agrawal, A.K., Rai, S.K. and Bindra, K.S., <b>2021</b> Experimental investigation on laser directed energy deposition based additive manufacturing of Al <sub>2</sub> O <sub>3</sub> bulk structures, Ceramic International 47, pp 5708-5720.
7.	Yadav, S., Paul, C.P., Jinoop, A.N., <b>Rai, AK.</b> , and Bindra, K.S., <b>2020</b> , Laser directed energy deposition based additive manufacturing of copper: process development and material characterizations, Journal of Manufacturing Process., 58, pp 984-997.
8.	<b>Rai, A.K.</b> , Srinivasulu, B, Paul, C.P., Singh, R., Rai, S.K., Mishra, G.K., Bontha, S., and . Bindra, K.S, <b>2020</b> , Development of thick SiC coating on thin wall tube of zircaloy-4 using laser based directed energy deposition technique, Surface and Coatings and Technology 398, 126088.
9.	<b>Rai, A.K.</b> , Biswal, R., Gupta, R.K., Rai, S.K., Singh, R., Goutam, U.K., Ranganathan, K., Ganesh, P. Kaul, R., and Bindra, K.S., <b>2019</b> , Enhancement of oxidation resistance of modified P91 grade ferritic- martensitic steel by surface modification using laser shock peening, Applied Surface Science 495, 143611.
10.	<b>Rai, A.K.</b> , Biswal, R., Gupta, R.K., Rai, S.K., Singh, R., Goutam, U.K., Ranganathan, K., Ganesh, P. Kaul, R., and Bindra, K.S., <b>2019</b> , Study on the effect of multiple laser shock peening on residual stress and microstructural changes in modified 9Cr-1Mo (P91) steel, Surface and Coatings Technology, 358, pp 125-135.