

Focus	Alloy	Freemelt user	Country	Paper title and link
Gum metal (TNTZ)	Ti-35.5Nb-2Ta-3Zr	Bergische Universität Wuppertal	Germany	Powder Bed Fusion - Electron Beam of an oxygen-compatible β-TNTZ (Ti-35.5Nb-2Ta-3Zr) alloy: Feasibility and Material Evaluation
Steel	ER70S-6 steel	Carnegie Mellon University	United States	Trajectory Optimization for Spatial Microstructure Control in Electron Beam Metal Additive Manufacturing
Steel	316L stainless steel	Carnegie Mellon University	United States	ADDOPT: An Additive Manufacturing Optimal Control Framework Demonstrated in Minimizing Layer-Level Thermal Variance in Electron Beam Powder Bed Fusion
Ni-base SX superalloy	CMSX-4	FAU Erlangen-Nürnberg	Germany	Multiple interaction electron beam powder bed fusion for controlling melt pool dynamics and improving surface quality
Titanium alloy	Ti-6Al-4V	FAU Erlangen-Nürnberg	Germany	Correlating outgassing and smoke phenomenon in electron beam powder bed fusion of Ti6Al4V using a residual gas analyzer
Shape-memory alloy	NiTi	FAU Erlangen-Nürnberg	Germany	Anisotropic Superelastic and Shape Memory Effect of Nitinol Manufactured by Electron Beam Powder Bed Fusion
Steel composite	TiC/Steel	FAU Erlangen-Nürnberg	Germany	Additive Manufacturing of TiC/Steel Composites Using Electron Beam Melting and In Situ Infiltration
Soft magnetic alloy	Fe93.5-Si6.5	FAU Erlangen-Nürnberg	Germany	Correlation Between Structural Features and Magnetic Performance of Fe93.5Si6.5 (wt.%) Soft Magnetic Materials
Titanium and Ni-base SX superalloy	Ti-6Al-4V and CMSX-4	FAU Erlangen-Nürnberg, KTH Royal Institute of Technology, Helmholtz-Zentrum Hereon	Germany, Sweden	Revealing the Mechanisms of Smoke during Electron Beam–Powder Bed Fusion by High-Speed Synchrotron Radiography
Shape-memory alloy	NiTi	FAU Erlangen-Nürnberg, Technische Universität Dortmund	Germany	Thermo-mechanical Study on Auxetic Shape Memory Periodic Open Cellular Structures—Part II: Mechanical and Shape Memory Properties
Precipitation-hardened copper	CuCrZr	Politecnico di Torino	Italy	CuCrZr alloy obtained via electron-beam powder bed fusion: Microstructural insights and precipitation behaviour
Copper alloys	pure Cu and CuNi2SiCr	Politecnico di Torino	Italy	Optimization of additive manufacturing processes for copper and its alloys
Copper	Pure Cu	Ruhr-Universität Bochum, Bergische Universität Wuppertal	Germany	Powder bed fusion of pure copper using an electron beam – achieving high conductivity by real-time process monitoring and control
Copper-chromium composite	Cu-25Cr	University Grenoble Alpes	France	Microstructure Evolutions Induced by Electron Beam Melting of a Sintered Cu-25Cr Composite

Aluminium alloy	Al-4Mn-3Ni-2Cu-1Zr	University Grenoble Alpes	France	Microstructure Formation of a New Al-4Mn-3Ni-2Cu-1Zr Aluminium Alloy During Electron Beam Powder Bed Fusion
Refractory ceramics	NbC	University of Linköping	Sweden	Feasibility of Melting NbC Using Electron Beam Powder Bed Fusion
Refractory ceramics	TiB ₂	University of Linköping, Bergische Universität Wuppertal	Sweden, Germany	In-melt electron analysis to accelerate process exploration of ceramics: Electron beam melting of TiB₂
Steel	SS 316L	University of North Texas	United States	Electron Beam Additive Manufacturing of SS316L with a Stochastic Scan Strategy: Microstructure, Texture Evolution, and Mechanical Properties
Ni-base superalloy	In718	University of Texas at El Paso	United States	Comparative Study Of Hydrogen Embrittlement On Ebm Inconel 718 As-Built And Hiped Specimens
Ni-base superalloy	In718	University of Texas at El Paso, University of Arizona	United States	Microstructure Refinement of Bulk Inconel 718 Parts During Fabrication with EB-PBF Using Scanning Strategies: Transition from Bidirectional-Raster to Stochastic Point-Based Melting

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Aluminium alloy	Al-4Mn-3Ni-2Cu-1Zr	University Grenoble Alpes	France	Microstructure formation of a new Al-4Mn-3Ni-2Cu-1Zr Aluminium alloy during Electron Beam Powder Bed Fusion - ScienceDirect
Molybdenum	Molybdenum	Politecnico di Torino	Italy	https://www.sciencedirect.com/science/article/abs/pii/S0263436825000563
Stainless Steel	316L	Linköping University	Sweden	https://www.sciencedirect.com/science/article/pii/S0264127525002576?via%3Dihub
Molybdenum	Mo-Si-B (Mo-9Si-8B)	FAU Erlangen	Germany	https://link.springer.com/article/10.1007/s40964-025-01119-z
Ni-base superalloy	CMSX-4	FAU Erlangen	Germany	https://link.springer.com/article/10.1007/s40964-025-01158-6
Real-time X-ray characterization of Electron Beam Powder Bed Fusion (E-PBF)		KTH Royal Institute of Technology	Sweden	https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1957938&dswid=4652

Innovative powder- and beam-based techniques				https://link.springer.com/book/10.1007/978-3-031-78350-0
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