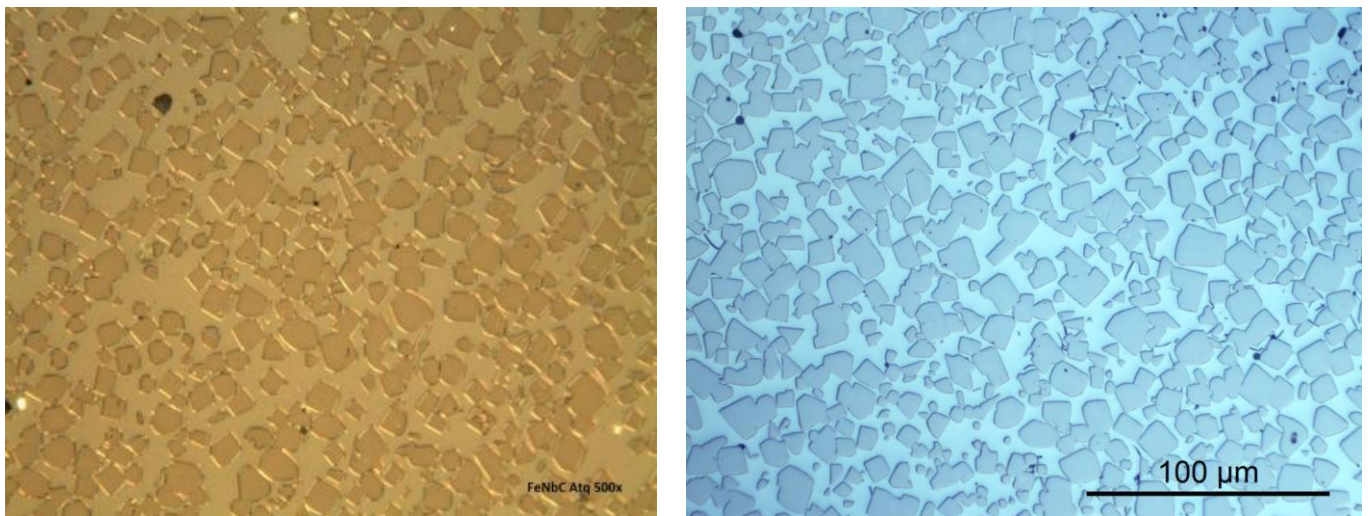




Niobium Carbide - Iron Matrix

CBMM is developing a new product that improves the wear resistance of diverse components. Niobium Carbide - Iron Matrix (NbC-Fe) contains very fine niobium carbides distributed in an iron matrix. It can be added easily to steel and cast iron, or it can be used directly in the production of hard material parts. Niobium carbide is resistant to wear and corrosion and retains these properties at high temperatures. Its exceptional wear resistance is due mainly to the unique inherent characteristics of the hard carbide phase.



Optical micrographs of NbC-Fe.

Niobium Carbide - Iron Matrix is available in a wide range of niobium contents and grain sizes. The product is technologically relevant for several applications, including rolling mill rolls, piston sleeves and heavy mining equipment liners and wear plates.

Range of chemical composition and density of NbC-Fe

Fe	Nb	C	Others	Density
	(wt%)	(wt%)		(g/cm ³)
Base	30-60	4-8	Cr, Ni, Co, Mo, Al, Mn, Si	6.0-7.0

NbC- Fe particle size (mm)				
<1	1-5	5-12	12-25	25-50



Fine powder NbC-Fe (<1 mm).



Medium particle size NbC-Fe (12-25 mm).

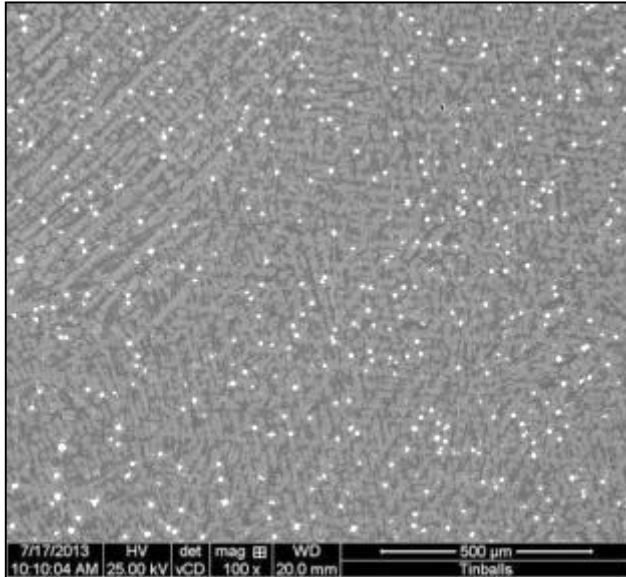
The dissolution of the iron matrix in liquid metal allows the transfer of niobium carbide particles to the melt. Since the density of niobium carbide is quite similar to melted iron, 7.85 g/cm^3 (20 °C), the particles distribute homogeneously, resulting in fine microstructures. Depending on particle size, NbC-Fe can be added to the bath by simple addition, injection or melting down together with the metallic charge of the furnace.



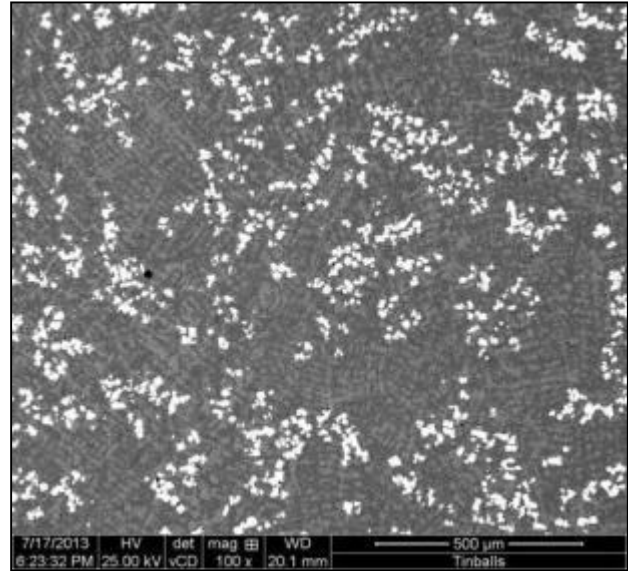
Dissolution of NbC-Fe during melting down of the metallic charge in an induction furnace.



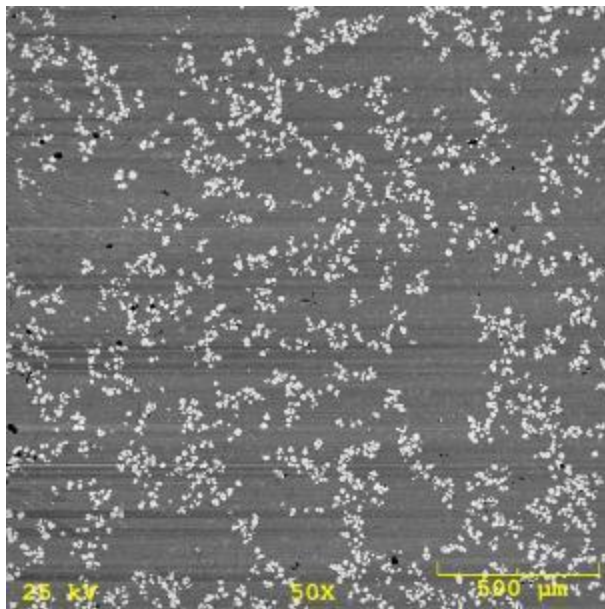
Dissolution of NbC-Fe by addition to the bath after the melting down of the metallic charge.



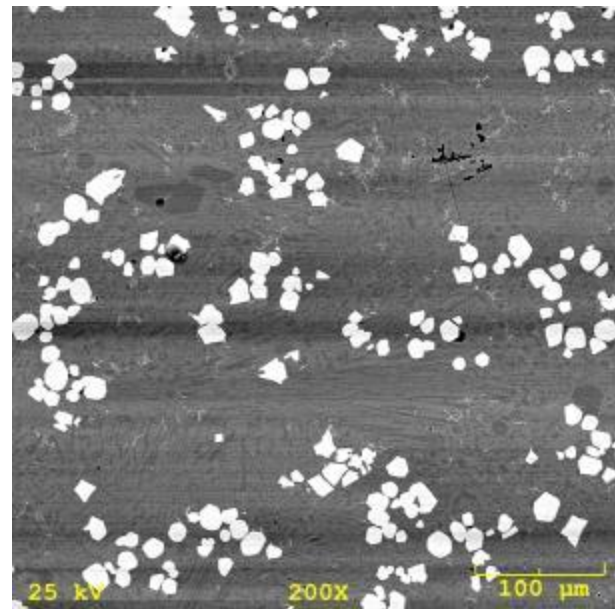
NbC particles transferred from NbC-Fe to a Ni hard indefinite chilled cast iron (5%NbC). 100x



NbC particles transferred from NbC-Fe to a Ni hard indefinite chilled cast iron (15%NbC). 100x



NbC particles transferred from NbC-Fe to white cast iron (15%NbC). 50x



NbC particles transferred from NbC-Fe to white cast iron (15%NbC). 200x