Technical Data Sheet

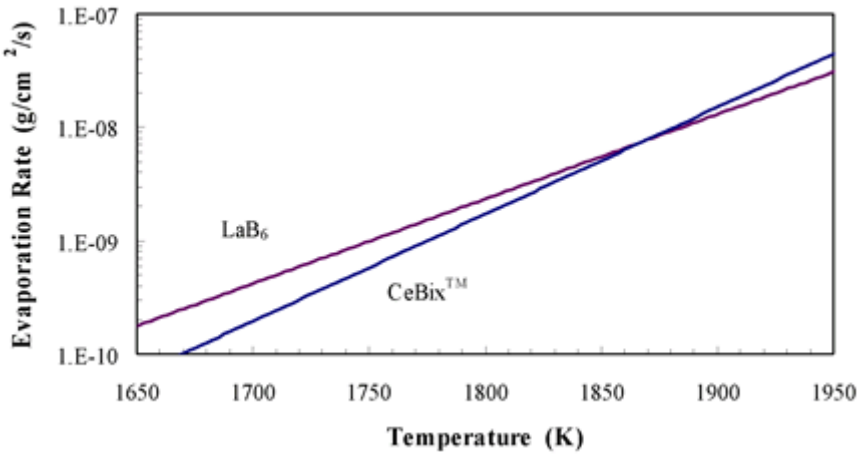
Comparing Lanthanum Hexaboride (LaB_6) and Cerium Hexaboride (CeB_6) Cathodes

#80920 - 80933

The performance and lifetime of the hexaboride cathode are determined by several factors: vacuum level, cathode temperature, impurity level, crystal orientation, tip shape, and mount design.

CeB_6 exhibits a lower evaporation rate

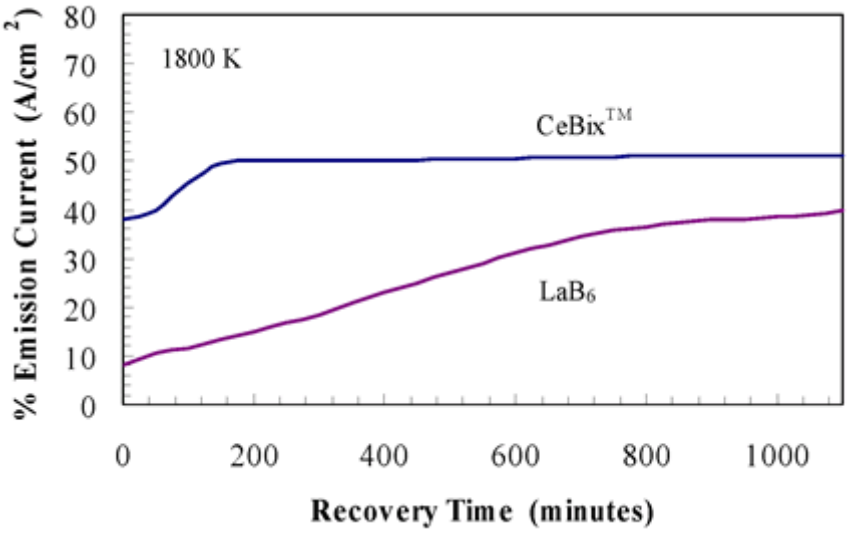
CeB_6 has an evaporation rate at normal operating temperatures near 1800 K that is lower than that of LaB_6 . So long as care is taken to operate the cathode below 1850 K, CeB_6 should maintain an optimum tip shape longer, and therefore last longer.



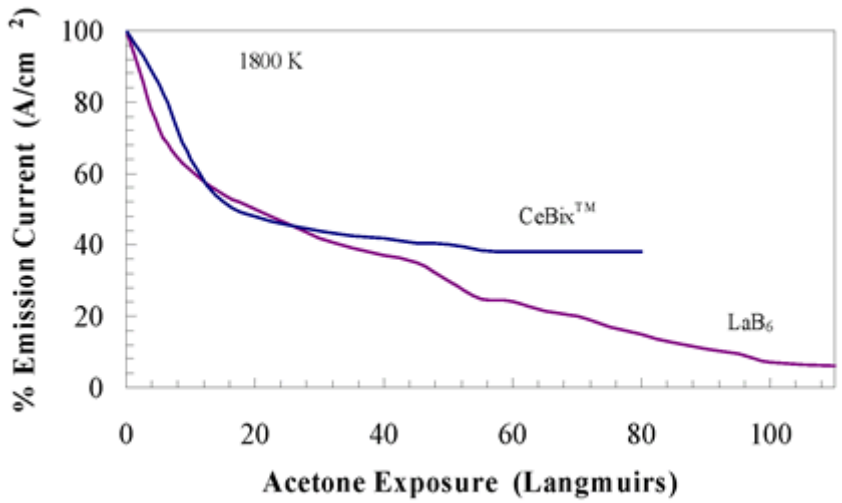
Evaporation Rate Comparison for LaB6 and CeBix™ at 2 x 10-8 Torr

CeB_6 is more resistant to carbon contamination

In laboratory tests, CeB_6 has proven to be more resistant to the negative impact of carbon contamination than LaB_6. This increases stability and results in less time to reach stable operation and more rapid recovery from contamination events.



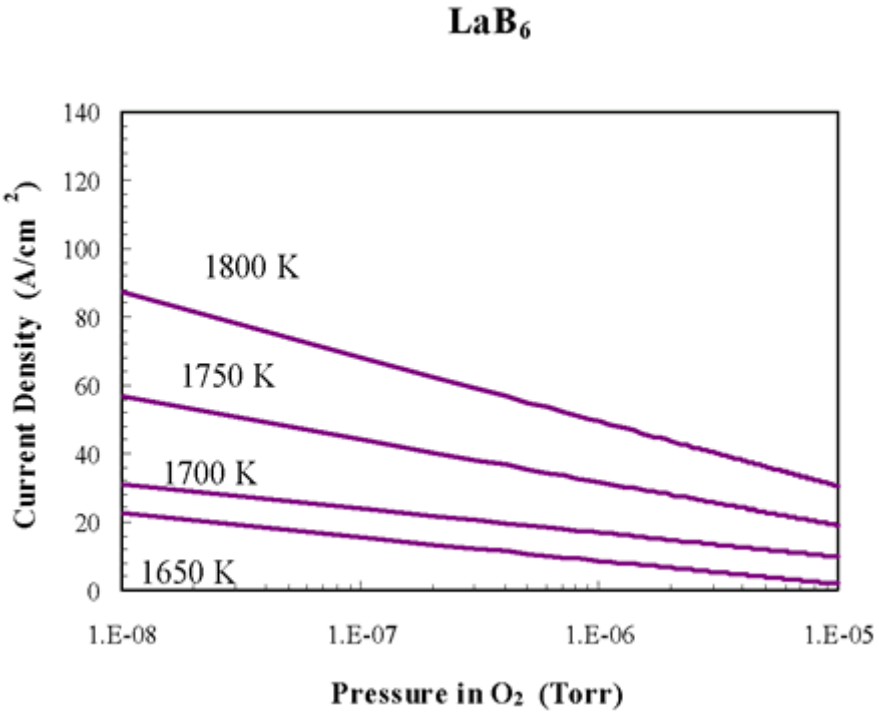
Recovery from Carbon Contamination Comparison between LaB6 and CeBix™

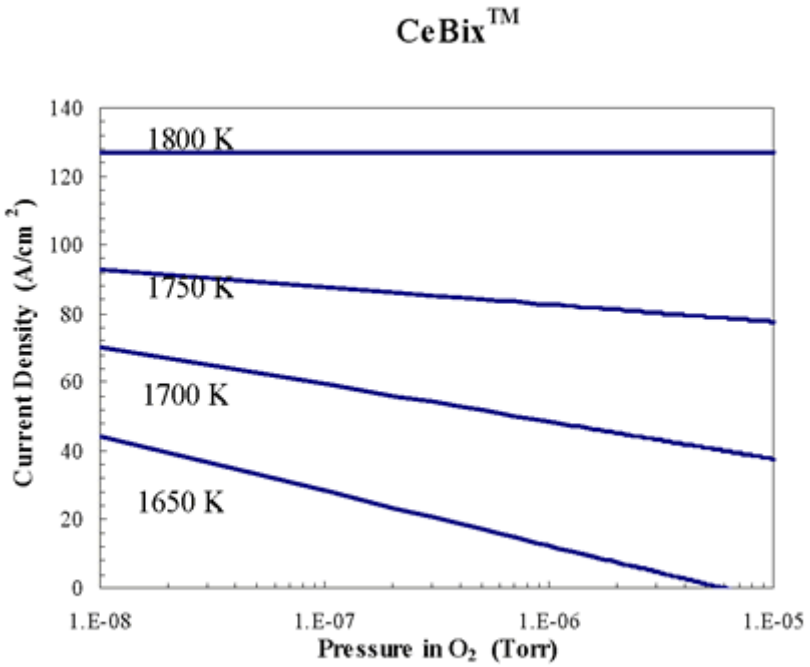


Carbon Contamination Comparison between LaB_6 and CeBix™

Reduced effects of O_2 on CeBix™

The effects on oxygen on current density is shown in the figures below for LaB_6 and CeBix™.





Material Data for LaB_6 and CeB_6

Parameter	Units	LaB_6	CeB_6
Stoichiometry	N/A	~6	
Metal Impurities	ppm by wt.	<30	
Density	g/cm^3	4.72	4.80
Coefficient of Thermal Expansion	α x 106	5.6	6.2
Electrical Resistivity	μΩ-cm	~50	~65
Effective Work Function (100) at 1800 K	eV	2.70	2.65
Spectral Emissivity at 0.65 microns	N/A	0.765	0.779
Evaporation rate at 1800 K (UHV)	$g/cm^2/s$	2.2×10^{-9}	1.6×10^{-9}
Orientation limit for specific orientation	degrees	<2	
Pyrolitic block mount resistance @ 1800 K	Ohms	1.45	