



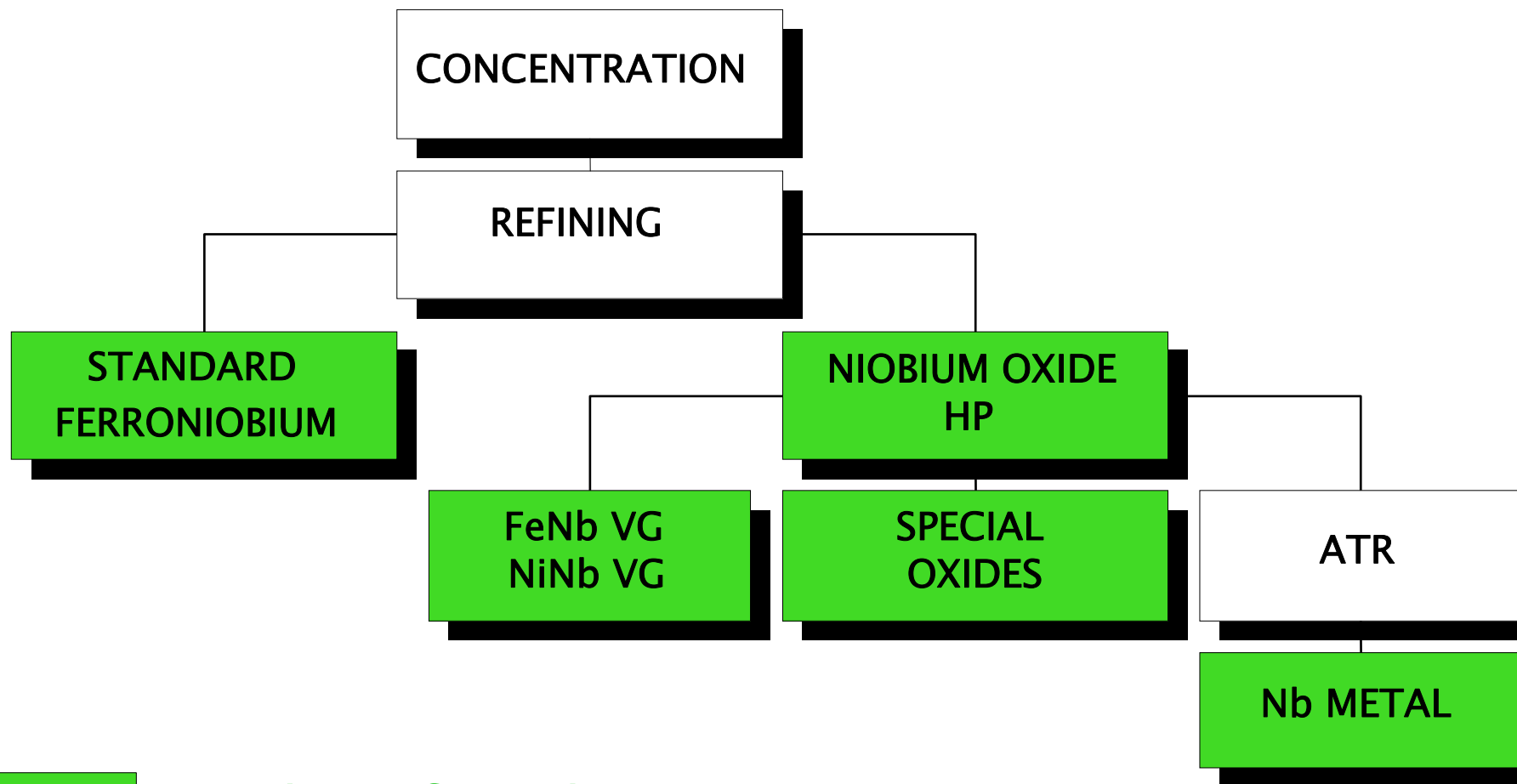
Single Crystal Niobium Technology Workshop

October 30th - November 1st, 2006
Araxá - Brazil



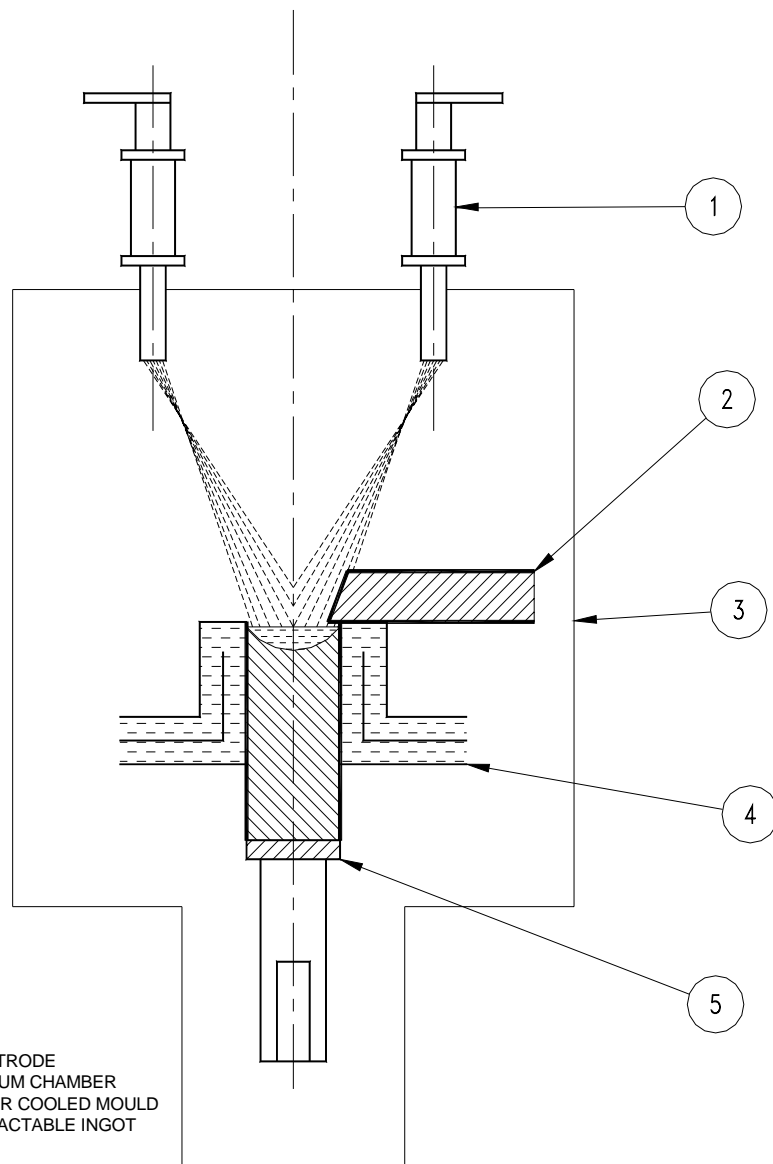


Production



 Products for Sale

HORIZONTAL DRIP MELT



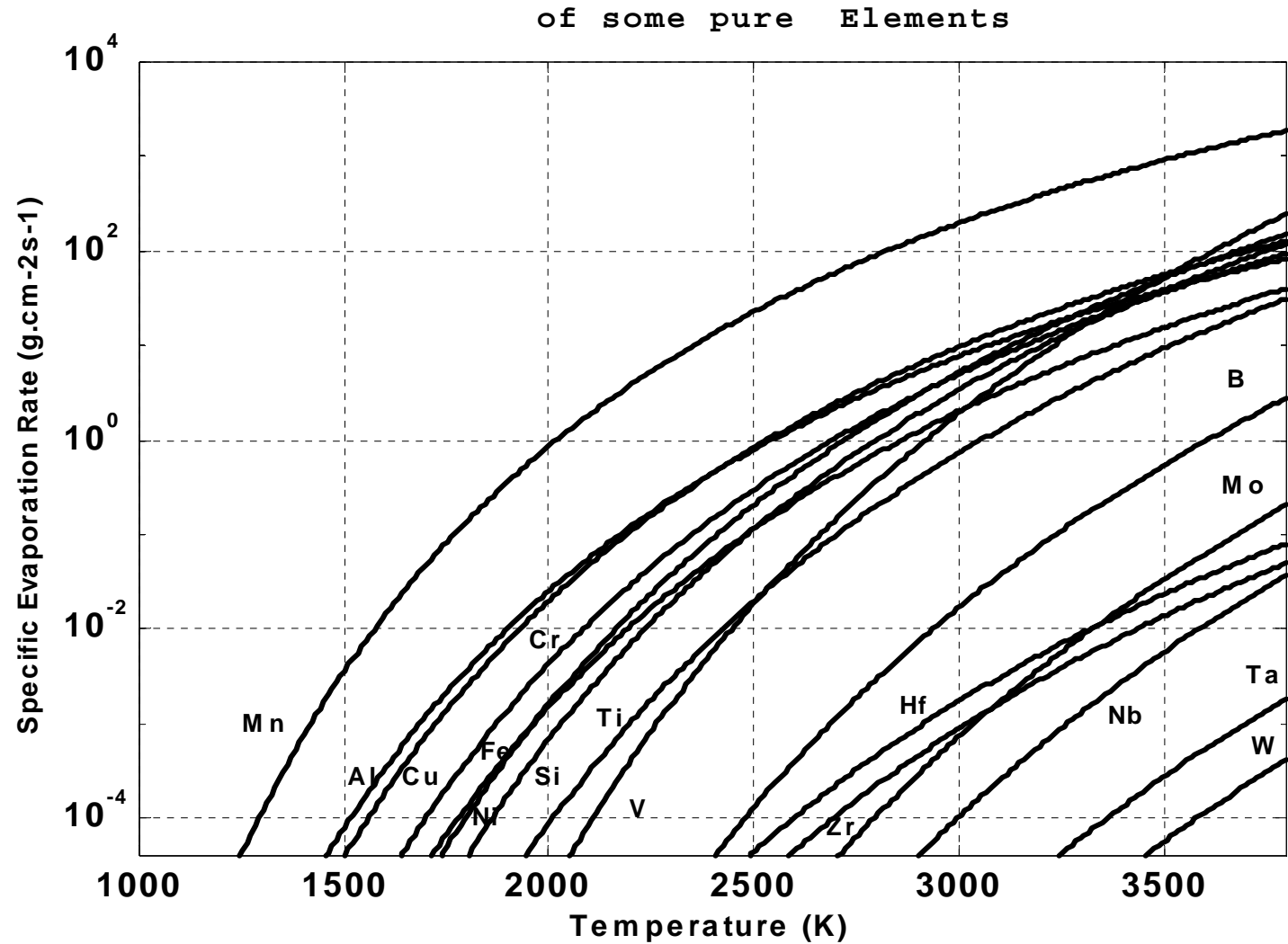
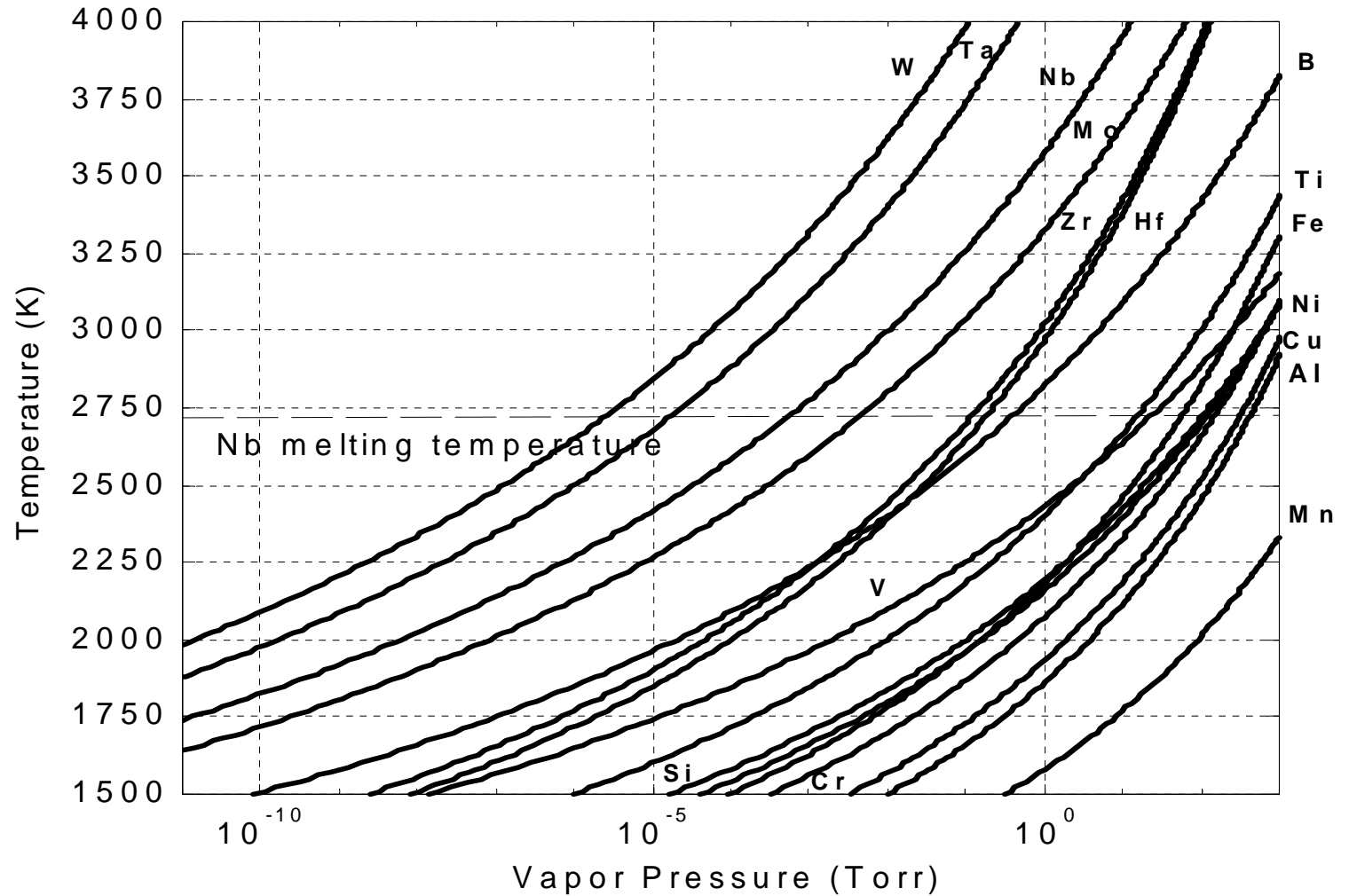


FIG.I-Saturation vapor pressures of some metals



CBMM ELECTRON BEAM FURNACE #2



Start-up in 2003



CBMM ELECTRON BEAM FURNACE #2



High Pumping capacity: 165,000 l/s

Innovate, Respect, Compete

CBMM ELECTRON BEAM FURNACE #2



3 electron beam guns with 600kW each

CBMM ELECTRON BEAM FURNACE #2



Capability of Niobium Cold-Hearth refining

CBMM ELECTRON BEAM FURNACE #2



- Ingots from 250mm to 400mm in diameter
- Lengths up to 2,000mm and weight of 2 tonnes



Large grain/single crystal

Important parameters in production:

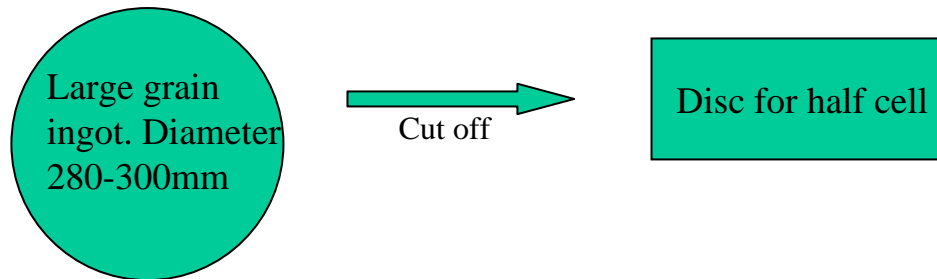
- Thermal balance
- Beam control

Simultaneous phenomena:

- Nucleation (and dissolution ?)
- Competitive growth (in Large Grains)

Large grain/single crystal cavity

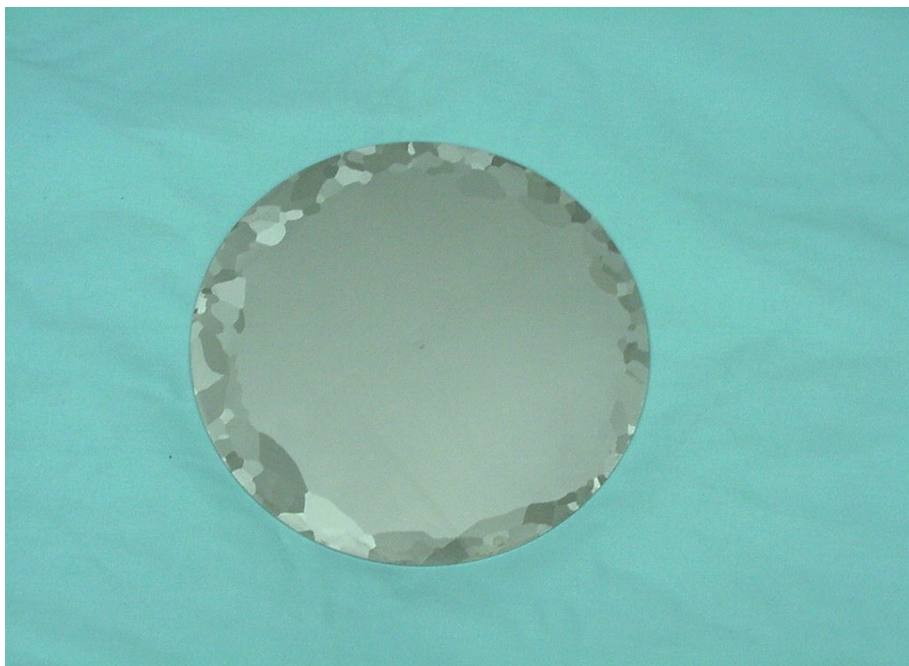
Proposal of G.Rao (JLab), P.Kneisel (JLab), T. Carneiro (CBMM)



Possible advantages:

- Seems to be cost effective
- Higher purity. RRR=600 in the ingot is achievable
- Simplified quality control (reduced number of measurements: grain size etc, possibly no scanning)

CBMM LARGE GRAIN NIOBIUM



Single Cell RF cavity produced with Single Crystal Niobium
Jefferson Lab / CBMM Cooperation



CBMM LARGE GRAIN NIOBIUM





Collaboration with DESY/Reference Metals on RRR Niobium(7)

Material	Ta- contents	RRR - value	$Q_0 @ E_{acc}$ max	$E_{acc, max}$ [MV/m]
Fine grain sheet	<500 ppm	~ 700	3.6×10^9	31.8
Fine grain sheet	~ 160 ppm	~323	7.5×10^9	33.5
Fine grain sheet	~ 600 ppm	~345	7.5×10^9	35.9
Fine grain sheet	~ 1300 ppm	~240	9.45×10^9	29.6
"single crystal" (2.2 GHz)	~ 800 ppm	~ 270	4.0×10^9	43 (pulsed) (185 mT)



Capability

Conditions that facilitate production in CBMM:

- Ta content that doesn't disturb normal production ($\sim 1,500$ ppm);
- Large grains instead of Single Crystal;

