

May 29, 2003

Panasonic Super Graphite (PSG) market analysis

MEI CITD

Data source: MEI Corporate Manufacturing Innovation Division

Application	Possible target segment	How to use	Sales record & business opportunity
Wavelength filter for neutron radiation	<p>Organization which hold a research reactor such as:</p> <ul style="list-style-type: none"> - Brookhaven National Laboratory (http://www.bnl.gov/world/) - Los Alamos National Laboratory (http://www.lanl.gov/worldview/) - Oak Ridge National Laboratory (http://www.ornl.gov/) 	Wavelength filter for neutron radiation generated from nuclear reactor.	<p>-Equip a set of PSG at a neutron radiation outlet. One piece is around 5"-6"×2"×0.5" and 3-4 pieces of PSG lump were tied up in a single set. Deliver six sets of PSG to Japanese Nuclear Power Laboratory in the past. (approx.\$50k/set)</p> <p>-Demand will be occurred when optical system of nuclear reactor is converted.</p>
	<p>Organization which generate a pulsed neutron by accelerator. (cf: Japanese "High Energy Accelerator Research Organization" (HEARO) http://www.kek.jp/intra.html)</p>	For wave condensing and wavelength unification for neutron radiation generated by accelerator.	<p>Various applications depending on researchers. For instance, HEARO bought at least 700 pieces of small lump in the past.</p> <p>Both size and width are controllable as per customer requirement.</p>
Wavelength Filter for X-ray.	<p>Organization which generate X-ray by accelerator. (cf: Japanese "Spring-8" http://www.spring8.or.jp/e/index.html)</p>	<p>Panasonic can make thinner width (less than 1mm) up to customer usage.</p>	<p>Ongoing testing is held in order to use as optical noise filter.</p>
		<p>Shutter</p>	<p>Primary test by Spring-8 was well. US laboratory must have bigger interest as a replacement of current shutter material because of high block capability for X-ray.</p>
	<p>X-ray researcher</p>	<p>Use for a study for diffraction. (20 x 20mm square, bent shape)</p>	<p>Many inquiry from Japanese X-ray researcher, but no sales yet.</p>
Standard specimen for STM (Scanning tunneling microscope)	Measurement machine vender		Constant sales in this field in Japan.
Others	Cosmic X-ray operational Satellite	Wavelength division with thinner plate (less than 1mm)	One or two satellites has already been equipped.
	Thermal diffusion material for the electric parts used for a missile and rocket.	High thermal diffusivity even small area.	<p>National Space Development Agency of Japan had interest.</p> <p>(http://www.nasda.go.jp/about/index_e.html)</p>

Physical properties of Panasonic Super Graphite

Properties	Data	Remarks
Lattice parameter	3.354-3.356Å	3.354Å for single crystal
Density	2.20-2.25g/cm ³	2.26g for single crystal
Electric conductivity (horizontal)	23,000S/cm	25,000S/cm for single crystal
(vertical)	5-6S/cm	
Thermal conductivity (horizontal)	10W/Kcm	Twice higher than copper's.
(vertical)	0.05W/Kcm	
Durable temp in air	860 C	
in inert atmosphere	>3,000 C	
Young's modulus	750 GPa	
Sound speed	18,000m/s	
Linear expansion coefficient (horizontal)	-1.0 x 10 ⁻⁶ /K	
(Vertical)	27 x 10 ⁻⁶ /K	