Fabrication of porous tin(IV)oxide as a laser-plasma EUV source target

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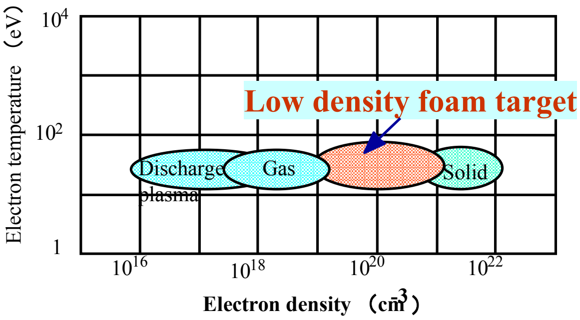


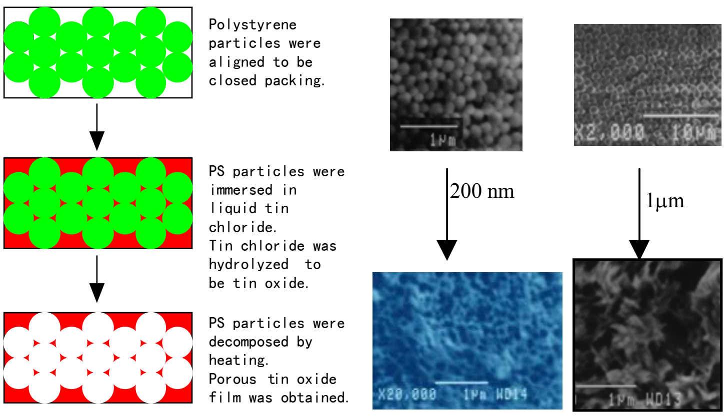
SUMMARY

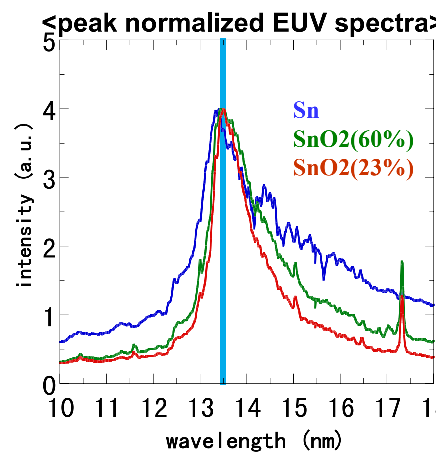
The present report describes fabrication of tin target for laser-plasma EUV light source.

To achieve high EUV emission, laser plasma should be controlled in terms of the temperature, the pressure and the density profile. A solid low-density target well-controls the density of plasma..[1] Therefore it is important wide range density solid target for examining the character of EUVL to find efficient EUVL targets.

Tin (Sn) is one of the candidates to generate EUV emission at 13.5 nm. We have obtained low-density SnO_2 by two different methods of nano-porous particle technique and sol-gel technique. Former gave various nanostructured structure SnO_2, with 24% solid density. Later gave 1%~25% densitiy of solid SnO_2.and the density. Ultralow density plastic foam is a good support matrix of various heavy elements. We have obtained plastic foams with 1/300 density of solid.

1. Low Density SnO2



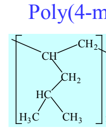


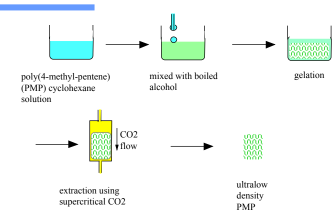
2. Ultralow-Density Foam Plastics as Matrix of Heavy Elements

Table I. Characteristics of low-density poly(4-methyl-1-pentene) foam prepared from alcoholic gel

Coagulant	*foam density* (mg/cm3)	*disk size* (µm)	*corresponding cutoff laser wavelength* (µm)
1-hexanol	12	~10	~ 0.55
2-methyl-1-pentanol	5.0	~3	~ 0.84
2-ethyl-1-butanol	2.0	~6	~ 1.3
1-butanol	~3	~1	~1
2-butanol	~3	~2	~1
2-methyl-1-propanol	~3	~1	~1
2-methyl-2-propanol	~3	<1	~1

Poly(4-methyl-1-pentene)





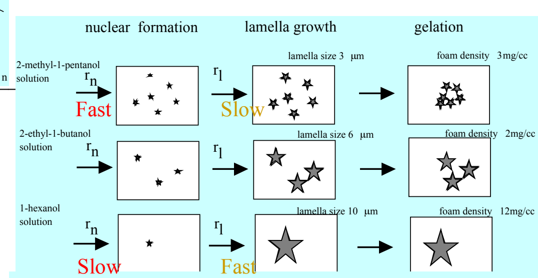


Fig. Schematic view of coagulation process in terms of nuclear formation and lamellar structure growth. The lamella size would be determined by the ratio of (r_n/r_l).

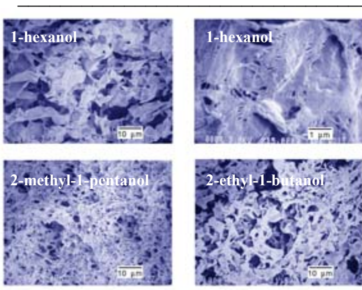


Fig. SEM image of poly(4-methyl-1-pentene) foams prepared from hexanol derivative gel (reference 2)

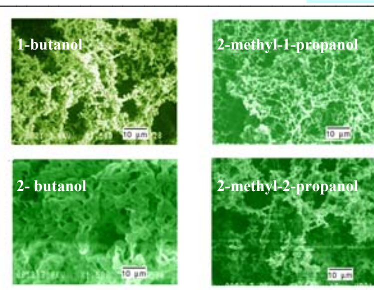


Fig. SEM image of poly(4-methyl-1-pentene) foams prepared from butanol derivative gel (reference 3)

1) K. NAGAI et al., JP Patent.

2) K. NAGAI et al., *Jpn. J. Appl. Phys.*, **41**, L431 (2002).

3) K. NAGAI et al., *Fusion Sci. Technol.*, in press.

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