

MANUFACTURING OF LASER TARGETS BASED ON LOW-DENSITY (10 mg/cm^3) CARBON FOAM

E. M. Pisarev, N. A. Phaiko, S. A. Lekomtsev

FSUE «RFNC – VNIITF named after Academ. E. I. Zababakhin», Snezhinsk, Russia

In laser experiments double-layer targets are used, which represent a massive tungsten substrate with low-dense (from 10 to 100 mg/cm^3) coating layer applied on one of its sides. The coating structure should be uniform, with pore size being much lesser than the laser focal spot diameter. The target design is presented in Fig. 1.

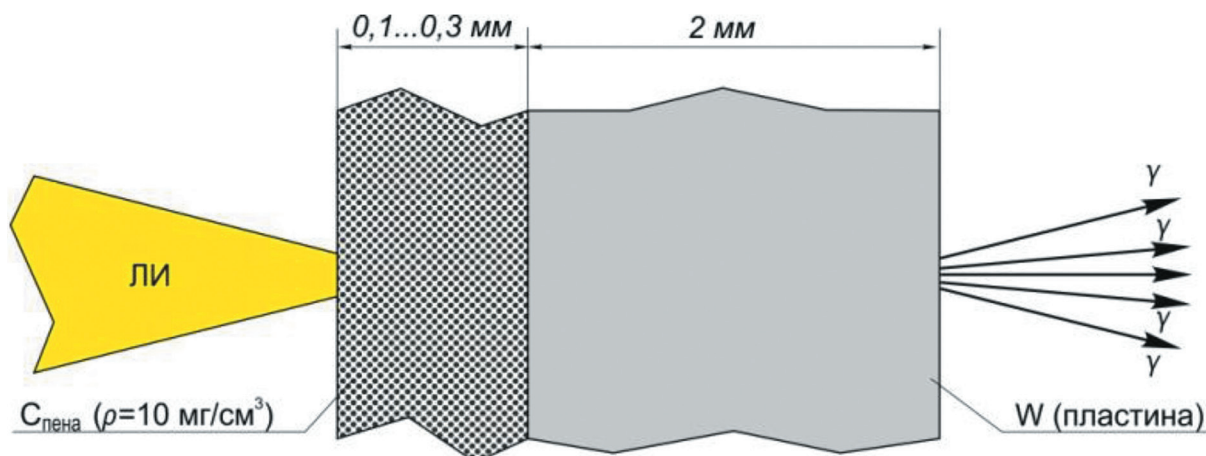


Fig. 1. Laser target design

The paper presents the experimental refinement of an easy method to manufacture a low-density carbon coating based on organic material (paraffin) dehydrogenization. Fig. 2 presents the scheme of cyclic application of such coating over the tungsten substrate, and the Table 1 shows its characteristics.

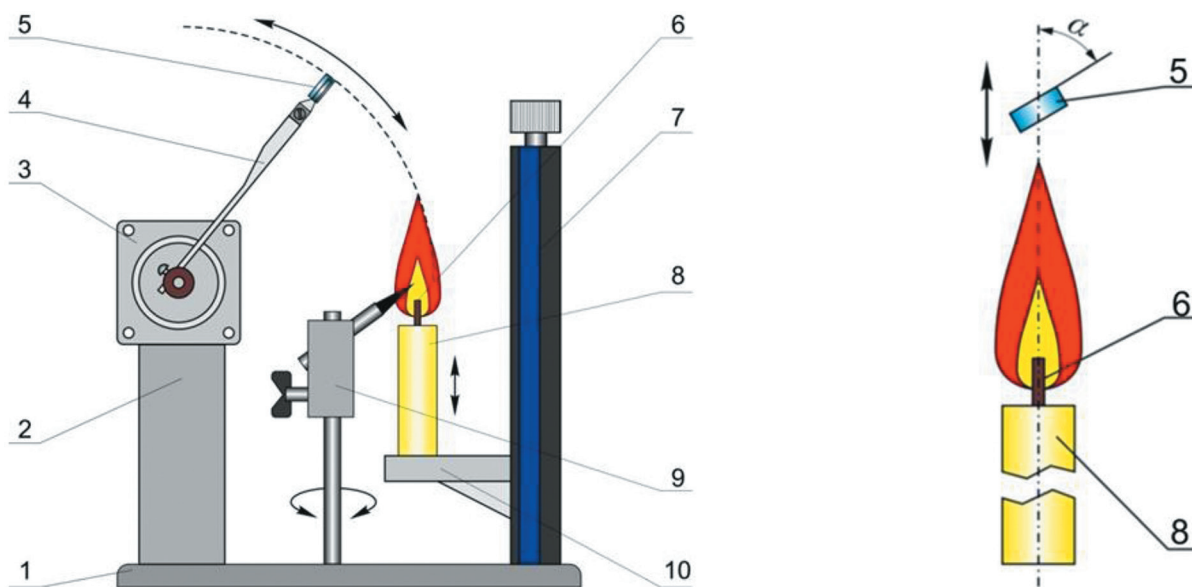


Fig. 2. Scheme of low-density carbon coating in semiautomatic mode:

1 – base; 2 – step motor pillar; 3 – step motor; 4 – sample holder; 5 – sample; 6 – wick; 7 – lifting mechanism; 8 – candle; 9 – turning indicator; and 10 – candle holder

Table 1

Low-density coating characteristics

No	Exposure, s	Angle α , degrees	Number of cycles	Thickness, μm	ρ , mg/cm^3
2	0.5	90	45	100 ± 10	117 ± 12
4	2	90	45	130 ± 10	94 ± 7
5	3	90	45	100 ± 10	180 ± 20
6	0	45	135	140 ± 10	10 ± 7
7	0	45	180	190 ± 10	10 ± 1
8	0	45	270	290 ± 10	9 ± 1

The analysis performed using the scanning electron microscope (Fig. 3, a) have shown that the given material represents a porous structure with pore size of $250 \div 500$ nm with the walls consisting of fullerenes $60 \div 80$ nm in diameter. Fig. 3, b presents the finished laser target.

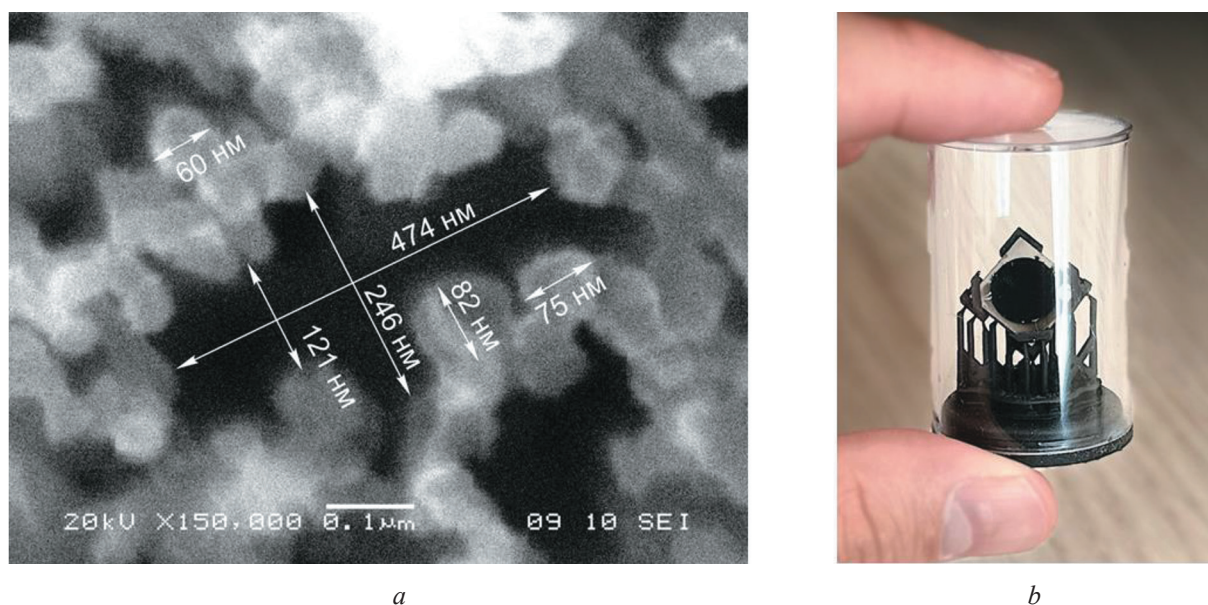


Fig. 3. SEM image of the coating surface (a) and external view of the finished laser target (b)

References

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