threshold, respectively. It follows therefore that inhomogeneities with a characteristic dimension close to 10^{-5} cm^2 make an appreciable contribution to the x excitation of the multimode generation (not only by contributing to independent channels, but also by stopping stationary generation by internal Q-switching, mode competition, etc.).

While a small-size laser cannot increase appreciably the power of single-mode generation, it does improve the ratio of the coherent-to-incoherent radiation intensity and can serve as a generator that drives a power amplifier. A similar behavior was observed in diodes of large resonator length but of width not larger than 20 μ. In this case about 100 mW of practically single-frequency cw emission was obtained at a threefold excess above threshold.

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SYNTHESIS AND SUPERCONDUCTING PROPERTIES OF CUBIC RHENIUM MONOCARBIDE

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As reported earlier, at a pressure $P \geq 60$ kbar and a temperature above 800°C, there is produced in the rhenium-carbon system a rhenium carbide with a hexagonal structure of the γ'MoC type, which is not superconducting down to 1.6°K [1]. It was of interest to continue these investigations in order to obtain a cubic face-centered carbide phase, since superconducting properties could be expected to appear in this modification.

The hexagonal carbide phase, as established in [1], remains stable up to 144 kbar. We show here that a new rhenium monocarbide modification with a structure of the NaCl type is produced at higher pressures.

The experiments were performed with a chamber producing pressures up to 180 kbar[1)] in a bulk sample simultaneously heated by current flowing through a heater placed inside the high-pressure chamber. The sample was synthesized from a mixture of powdered electrolytic rhenium (99.99) and powdered carbon (spectrally pure graphite). Since it is more convenient to use ceramic samples rather than powders to obtain stable pressure values, the mixture was first sintered at P = 90 kbar and T = 500°C, and then subjected to 160 - 180 kbar and

1)The pressure was determined from the jumps of the electric conductivities of the metals Bi (25.4, 26.9, and 89 kbar), Ba (59 and 144 kbar), and Pb (160 kbar).

about 1000°C for 2 - 5 minutes. The heaters were ampules made of spectrally pure graphite. The resultant product was investigated by x-ray diffraction, using powder Debye patterns with an RKD-57 camera and filtered copper radiation.

Almost all the samples obtained in the indicated pressure and temperature ranges were pure rhenium carbide with cubic face-centered structure of the NaCl type. Some of them contained admixtures of the hexagonal phase and of graphite. The fact that there were no metallic rhenium lines in all samples without exception, and most samples revealed likewise no graphite lines, gives grounds for assuming that the obtained carbide is close in composition to rhenium monocarbide. The unit-cell parameter of the new phase was 4.005 ± 0.002 Å, and the calculated density was 20.5 g/cm^3. The density measured pycnometrically was 19.5 ± 1.3 g/cm^3.

Rhenium carbide is metastable at atmospheric pressure. Annealing the samples in vacuum at 1000°C for two hours causes decay of the carbide and formation of a rhenium-carbon solid solution. A similar behavior was observed also for the hexagonal modification [1], the decay of which occurred when heated above 1200°C.

The superconducting properties of the cubic rhenium carbide was measured by a magnetic method. The critical temperature of the transition to the superconducting state is $T_c = 3.4 \pm 0.2$°K. The obtained data confirm the previously predicted tendency of the critical temperatures of cubic monocarbides of the transition metals of group VII (Tc, Re) to be lower than the isostructural carbides of the group VI metals (Mo, W) [2].

At the same time, it is well known that the critical temperatures of transition-metal carbides are strongly influenced by the composition of the sample (the molar ratio Me/C), which can greatly deviate from stoichiometric in the presence of a wide homogeneity range. This deviation leads to a considerable decrease of the critical temperature [3]. Since no exact analysis of the compositions of the cubic rhenium carbide synthesized under pressure was made, one cannot exclude the possibility that the obtained samples deviate from stoichiometric composition. In this case, higher critical temperatures should be expected for the carbide with the higher carbon content.

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INFLUENCE OF INTERFERENCE ON THE INTENSITY OF TRANSITION X-RADIATION IN A LAYERED MEDIUM

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The transition radiation produced when a charged particle passes through a layered medium has attracted much attention in connection with its possible use to identify particles at ultrahigh energies [1].