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Wireless Telegram Microwave ECRIS

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We have constructed tandem-type electron cyclotron resonance ion source (ECRIS) which consists of two individual ion sources [1]. We aim at synthesizing endohedral metallofullerenes by transporting metal ion beam from the first stage into the fullerene plasma in the second stage. Since the fullerene is dissociated in the second stage by use of conventional microwave source, low power microwave source is required. We have developed semi-dipole antenna and rod-type antenna in order to utilize 1.30/2.45 GHz-band wireless microwave source. The lengths are optimized for frequency of wireless microwaves. Herewith, these enable microwave to propagate to the second stage in high vacuum with co-axial mode. This paper describes investigation of properties of wireless microwave ECRIS as compared with magnetron and production of fullerene and argon ion beam using the ECRIS. It was possible to successfully ignite and sustain ECR plasma under extremely low microwave power within about 0.1 W to several Watts by use of this wireless microwave source. In addition, we discuss electric field intensity inside the chamber from wireless telegram microwaves. We are planning two frequency experiments simultaneously of 1.30 GHz and 2.45 GHz.

References

[1] Y. Kato, Y. Kurisu, D. Nozaki, K. Yano, D. Kimura, S. Kumakura, Y. Imai, T. Nishiokada, F. Sato, and T. Iida, Review of Scientific Instruments, 85(2014)02A950-1-3.

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