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Generation of Ionic Plasma without Electrons using Alkali Salt WATARU OOHARA, JYUN SHISHIDO, MASAHIRO NAKAHATA, RIKIZO HATAKEYAMA, Tohoku University, Japan — Accommodation of various dopant atoms, molecules, and compounds is available for modifying intrinsic electronic and mechanical properties of single-walled carbon nanotubes. For alkali metal and halogen atoms encapsulation, an alkali-halogen plasma is generated by a dc magnetron discharge under a uniform magnetic (B) field. Spiral and linear thermionic cathodes of tungsten wire are set at the central axis of a grounded cylinder, and they are negatively biased to form an electric field E perpendicular to the B field lines. Alkali-salt vapor is introduced from an oven, filling the cylinder. Thermal electrons drift in the azimuthal (ExB) direction and the electrons collide with alkali-salt vapor, dissociating and ionizing it. As a result of this process, alkali positive ions, halogen negative ions, and electrons are produced. A magnetic-filter region is situated at the exit of the cylinder and the electrons are removed from the plasma. The electron emission, the E and B fields, and the length of the magnetic-filter region are optimized, resulting in the alkali-halogen plasma with the ion density 10^8 cm^{-3} at B = 0.2 T.

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