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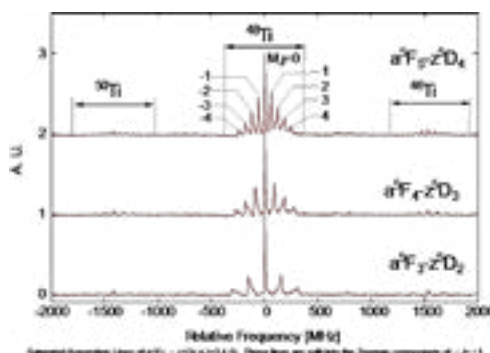
ATOMIC AND NUCLEAR PHYSICS

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Zeeman spectra of Ti I in a facing target sputtering system

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Absorption spectroscopy is useful for plasma diagnostics. Several functional films were fabricated using a facing target sputtering (FTS) system. During the sputtering process using the FTS system, high-energy ionized particles are confined by a magnetic field. However, the absorption lines of a species are split into the Zeeman components. The Lande g_j factor is very important for determination of the nature of atoms in a magnetic field. The saturated absorption lines of neutral Ti were measured in the region of 9950–14380 cm^{-1} by using a Ti: sapphire ring laser. The FTS system was used to obtain the gaseous state of a neutral Ti atom in this experiment. The Zeeman splitting of 38 transitions of $^{46,47,48,49,50}\text{Ti}$ species was observed. For ^{48}Ti species, the difference between the g_j factors of the odd and even parity states was obtained from the Zeeman splitting under the condition that the electric field component of a linearly polarized laser beam was parallel to the magnetic field. The g_j factors of the odd parity states were determined for 28 energy levels belonging to $3d^24s4p$ and $3d^34p$ by using those of the even parity states reported by E Stachowska in 1997. The g_j factors of $z^5P_{1,2,3}$ levels were determined for the first time. g_j of y^3F_2 , y^3D_2 , z^3P_2 , and z^3S_2 levels in the region of 25000–25600 cm^{-1} were refined. In addition, for the odd mass isotopes of $^{47,49}\text{Ti}$ of $b^3F_1 - y^3D_{1,1}$, the intermediate field approximated by calculation of the Zeeman effects in the hyperfine structure was used.



Biography

Nobuo Nishimiya is working on spectroscopic research on molecules and atoms. He has completed his PhD from Tokyo Institute of Technology. He is Professor at Tokyo Polytechnic University.

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