§16. Network of Atomic and Molecular Database Related to Processing Plasmas

Iinuma, K., Ito, H. (Chiba Inst. Tech.), Sakai, Y. (Hokkaido Univ.), Samukawa, S. (Tohoku Univ.), Sugai, H. (Nagoya Univ.), Nakamura, Y. (Keio Univ.), Hatano, Y. (Tokyo Inst. Tech.), Kono, A. (Nagoya Univ.), Matsumi, Y. (Nagoya Univ.), Sato, T. (Muroran Int. Tech.), Tanaka, M. (Pegasasu Co.), Tanaka, H. (Sophia Univ.), Tsumori, K., Kato, T., Kato, D. (NIFS)

Following progress from the previous year, work on the "**Network of Atomic and Molecular Database related to Processing Plasmas"** project has been conducted under the NIFS coordination. This project has included a number of application-related collaborations, e.g. plasma processing-including one company, atmospheric and radiological science research groups, to name a few.

As a challenge for the 21st century compilation and evaluation of these databases, so invaluable for science development and the industry, there is need for enlargement to include data from other areas of science and engineering. This project aims at searching for reliable atomic and molecular databases for further development of the plasma processing technology (e.g. vertical integrated computer-aided design for device processing). In this fiscal year, in order to arrange the concluding remarks, one consultative meeting was held that discussed the following.

(1) Present status of the on-going issue for the linkage between the IEE Japan data-base and the NIFS data-base. The conclusions from the meeting were that through Profs. Ito and Nakamura (the IEE Japan), NIFS negotiated officially the linkage possibility for the IEE data-base via the NIFS home page, specifically, together with the issues on the data-base royalty and atomic and molecular data bases for the process plasma modeling, emphasizing the comprehensive nature of the network as a data base and its potential for effective information exchange. In connection with this, D. Kato and H. Tanaka have been invited to be members of the new project in the IEE on Photon-Atom/Molecule Interaction Dynamics with Charged Particles, Excited and Dissociated Species. (2) An enormous amount of reference lists on atomic and molecular collision data compiled by late Prof. M. Hayashi (of The Gaseous Electronics Institute) has been completed in filing in the MS-Word form. These results will be available for the public on the NIFS DATA website or be published in the NIFS-DATA series. (3) The NIFS report has been arranged for the set of experimental electron-molecule collision cross sections data by H. Tanaka at the Sophia University under the title: *Elastic Differential Cross Sections for Electron Collisions with Polyatomic Molecules Since 2003*. In that report, the results from four years of research was reviewed for the survey of atomic and molecular data-base related to processing plasma, and for networking of atomic and molecular databases related to the processing plasma. In addition, the recent status of the atomic and molecular data needs demand from new trends in processing plasma, as well as from the international thermonuclear reactor design going at Cadrache, France, were reported, emphasizing that activities at the Data Center are now expected to be important for research in these fields of application.

The following three papers were presented at invited talks:

1) Elastic Differential Cross Sections for Electron Collisions with Polyatomic Molecules (H. Tanaka et al CUP CR-06-1-2 Elementary Processes in Plasma and the Application Chungnam Nat'l Univ. & NFRC 2006/11/1 Daejeon Korea).

2) Resonant Excitations of Molecules by Electron and Photon Impacts (H. Tanaka et al, 8th Asia-Pacific Conference on Plasma Science and Technology and 19th Symposium on Plasma Science for Materials 2-5th July 2006, Cairns, AU).

3) Resonance Phenomena related to Electrons (H. Tanaka et al, Japan Physical Society autumn meeting, Chiba University, Sep. 24, 2007)

Publications supported partially under this project are referred in each member's publication list.