Incorporating Principles of Industrial Ecology
Room Exhibit Hall C & D - Session IE-WeP

Poster Session

IE-WeP1 Accurate Measurement for PFC by Mass Spectrometry using New Ionization, *M. Nakamura, K. Hino, T. Sasaki,* ***Y. Shiokawa,*** Anelva Corporation, Japan

To establish a method of accurate measurement for PFC is urgent global task. But, present methods by FT-IR and conventional mass spectrometry using electron impact ionization (EIMS) have serious problems: all kinds of by-products must be assumed before measurement and the quantitative results by the methods do not agree with each other. In order to overcome the problems, we have developed Ion Attachment Mass Spectrometry (IAMS) using new ionization@footnote 1@ and applied it to measurement of PFC. In IA MS, a Li@super +@ from heated Li-oxide emitter attaches moderately to a gas molecule. The excess energy caused by attachment is very small and is removed immediately owing to many collisions with other gases at 100Pa. Therefore, the gas with Li@super +@ a re not dissociated and becomes stable an ion as a whole. First, raw C @sub 4@F@sub 8@ without generating plasma was measured by IAMS. Quasi-molecule peak of C @sub 4@F@sub 8@Li appeared on the mass spectrum and any fragment peaks could not be found, whil e only fragment peaks appear by EIMS. Detectable limit of C @sub 4@F@sub 8@ was less than 1ppm. Other PFC gases such as C@sub 2@F@sub 6@, CHF@sub 3@ and SF@sub 6@ showed same results. Next, exhaust gases from dry etching system with generating plasma of A r, C @sub 4@F@sub 8@ and O@sub 2@ were directly introduced into IAMS and measured. Unreacted C @sub 4@F@sub 8@ and some expected by-products such as C@sub 2@F@sub 4@, CHF@sub 3@ were clearly confirmed from their quasi-molecule peaks. But, more than 10 kinds of unexpected by-products such as C@sub 2@H@sub 3@F@sub 3@, C@sub 3@H@sub 3@F@sub 5@, C@sub 4@OF@sub 8@ were detected, too. It seems likely that the existence of these unexpected by-products cause the disagreement between results by FT-IR and EIMS. @FootnoteText@ @footnote 1@ T.Fujii, Chemical Physics Letters 191 162 (1992).

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