

DEVELOPMENT OF A NEW ON-LINE MEASUREMENT SYSTEM FOR ORGANIC SUBSTANCES IN NANO PARTICLES FROM DIESEL EXHAUST

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To develop a simple and rapid measurement method for chemical substances in nano particles, a system, which was combined differential mobility analyzer (DMA) and laser ionization time of flight mass spectrometry (TOFMS), was manufactured. In order to transfer the classified nano particles using the DMA into the laser ionization TOFMS, a pipe connecting the DMA and the condensation particle counter (CPC) was diverged. Downstream of the diverging point, several stopcocks were used to adjust more precisely the flow rates of sample gases. As a result, by tuning several stopcocks precisely, we were able to adjust the parameters required for normal operating. Next, the chemical substances in the nano particles contained in the diesel exhaust gas samples were measured using the system manufactured in this study. As a result, the diameter distribution of the diesel exhaust gas particles had a broad peak which peak top was about 200nm. The maximum number concentration of the diesel exhaust particles was approximately 400000 particles/cm³, which is about 5000 times higher than that of the laboratory air particles. Furthermore, the chemical substances in the classified 70 nm diameter particles of the diesel exhaust gas samples were analyzed using the laser ionization TOFMS. As a result, several clear mass spectra were detected in the wide m/z range of 70 to 300. Hence, the results showed that the system manufactured in this study is suitable for on-line and real-time measurements of chemical substances in nano particles.