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Potentiometric Ammonium Sensors and Their Applications
전위차법을 이용한 암모늄 센서와 응용

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The determination of ammonium is not only important to understand the various physiological activities of living organisms but also essential to monitor the subtle balance of echo environmental system. Recently, the strict monitoring of ammonia in semiconductor processing became an important issue; ammonia gas may contaminate the silicon wafer and surface priming agents to neutralize the photogenerated or catalytically generated acid in deep ultraviolet lithography process. Hence, there have been considerable efforts to develop efficient ammonia detection method. Potentiometric measurement of ammonia with ammonium-selective electrode (NH_4^+-ISE) is one of the highly effective ammonia detection methods. For example, airborne ammonia could be collected as ammonium through a gas-permeable tubing in which an appropriate buffer flows, and detected quantitatively by an NH_4^+-ISE installed in flow through analysis system. Biomaterials, which can produce NH_3 via enzyme reaction, may also be measured with NH_4^+-ISE-based biosensors. Typical NH_4^+-ISE usually employs nonactin as its ammonium-selective neutral carrier. So far, no synthetic neutral carrier exhibit similar potentiometric performance to that of nonactin, which suffers from poor discrimination of potassium. We recently, however, found that thiazol containing derivatives synthesized by Hong-Seok Kim can exhibit better ammonium selectivity over sodium and potassium than nonactin. In this presentation, we will discuss the development of new NH_4^+-ISE based on thiazol containing derivatives, applications of NH_4^+-ISE-based analytical systems for the detection of airborne ammonia, and an improved biosensors fabricated with NH_4^+-ISE and hydrophilic polyurethane.