Study on signal analysis of sodium aerosol detector with zinc-oxide nanostructures

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To reduce the risk of accidents in facilities using a large amount of sodium, the safety monitoring system should be equipt to track the leak point as soon as possible. This study analyzed resistance signals of a sodium leakage detector with zinc-oxide nanostructures under of the aerosol condition produced in sodium fire. The temperature condition was about 120℃, 160℃, 190℃ and 230℃ based on middle of test chamber which is near from the aerosol inlet and the combustion rate was controlled by oxygen concentration of 10vol%, 15vol% and total flow rate of 2 L/min. The resistance value was measured by SourceMeter(2450 models, KEITHLEY) which has 0.012% basic measure accuracy with 6 1/2-digit resolution. Before the actual sodium aerosol test, the detector was tested using ethanol gas to confirm the formation of zinc-oxide nanostructures on the electrode. The range of resistance signal at each experimental temperature was about 4.79 MΩ, 3.20 MΩ, 2.40MΩ and 1.04 MΩ at 15vol% of oxygen concentration. Based on the results of analysis from sodium aerosol detector with zinc-oxide nanostructures, we plan to develope the new leakeage monitoring system to track the leak point in real time.