

Surface Acoustic Wave Chemical Sensors

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An overview of the surface acoustic wave (SAW) chemical sensor literature since the introduction of this type of chemical sensor by Wohltjen in 1979 is given. After the historical overview, the physical and electronic aspects are thoroughly treated. These include basic SAW physics and electronics as well as design considerations for chemical sensors. Research on SAW chemical sensors deals with the development of suitable chemical interfaces that transduce signals from the chemical domain to the physical domain as selectively as possible. Chemical interface design philosophies are explained. Finally, a complete overview is given of the SAW chemical sensors reported so far in the literature, including sensors for analytes both in the gas phase and in the liquid phase.

1. Chemical Sensors

In chemical sensors, chemical signals are transduced into the appropriate electrical signals. These sensors are required to control preset process conditions or are needed for the protection of mankind, fauna and flora by measuring the concentrations of explosive, corrosive or toxic compounds or by warning when preselected concentrations are exceeded. A very important link in the automation process is the development of small, strong and inexpensive, yet reliable chemical microsensors.

In contrast to physical signals there are always a variety of chemical signals present at the spot to be monitored. As a consequence, sensor requirements of selectivity are very important. If one uses a (bio)chemical interface, these requirements can often be met. This interface interacts exclusively with the analyte as selectively as