

海底热液扩散流溶解硫化物的原位观测：电极的制备与性能标定

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摘要：

介绍了一种用于测定溶解硫化物浓度的新型离子选择电极（ISE）的制备方法和性能标定结果。以银丝为基材，用含超细银粉的导电聚合物作为中间层，在环氧树脂固化后通过化学反应形成Ag₂S层。以新型Ag/Ag₂S为工作电极，以Accument公司的Ag/AgCl为参比电极，构成溶解硫离子/硫化氢传感器。性能标定结果显示，这种新型固态传感器的响应电信号与硫离子浓度的对数呈线性关系，线性范围为10⁻²~10⁻⁷ (mol/L) 的硫离子。所测电压与硫离子浓度的对数之间斜率为-27.7，与理论计算得到的能斯特斜率dE/dlog*a* (-29.6 mV) 接近。它在响应速度、探测灵敏度和工作稳定性等方面均明显优于传统的ISE型传感器。

关键词：固态Ag/Ag₂S电极，原位观测，制备方法，性能表征

In-situ measurement of the dissolved S₂- in seafloor diffuse flow system: sensor preparation and calibration

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Abstract:

The preparation approach and calibration result of a novel type of Ion selective electrode (ISE), which is used to measure the total dissolved S₂-, is introduced in this paper. The novel Ag/Ag₂S electrode use the silver wire as the substrate, which surrounded by electric polymer containing superfine silver powder. After the stabilization of the epoxy-resin, Ag₂S layer was then coated by chemical reaction approach. The newly made Ag/Ag₂S electrode combined with the commercial reference electrode Ag/AgCl (Accument Co.) can be used to measure dissolved S₂-. The correlation between the measured potentials and the logarithm of dissolved S₂- is found to be linear, within the range of the concentration of dissolved S₂- from 10⁻²~10⁻⁷ (mol/L). The slope of regression line between measured potential vs. logarithm of dissolved S₂- is about -27.7, which agrees well with the theoretical Nernst value -29.6. Furthermore, the performance of the novel Ag/Ag₂S electrode, such as the response time, sensitivity and stability, greatly outweigh the conventional Ag/Ag₂S electrode.

Keywords: Solid Ag/Ag₂S electrode; In-situ measurement; Preparation approach; Performance;

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