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Design and Characterization of CMOS Readout Circuit for ISFET and ISE Based Sensors

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Abstract : This paper presents the design and characterization of analog readout interface circuits for ion sensitive field effect transistor (ISFET) and ion selective electrode (ISE) based sensor. These interface circuits are implemented using MIMOS's 0.35um CMOS technology and experimentally characterized under 24-leads QFN package. The characterization evaluates the circuit's functionality, output sensitivity and output linearity. Commercial sensors for both ISFET and ISE are employed together with glass reference electrode during testing. The test result shows that the designed interface circuits manage to readout signals produced by both sensors with measured sensitivity of ISFET and ISE sensor are 54mV/pH and 62mV/decade, respectively. The characterized output linearity for both circuits achieves above 0.999 rsquare. The readout also has demonstrated reliable operation by passing all qualifications in reliability test plan.

Keywords : readout interface circuit (ROIC), analog interface circuit, ion sensitive field effect transistor (ISFET), ion selective electrode (ISE), ion sensor electronics
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