



pH-ISFET CHARACTERISTICS

General	
Substrate	p-type 4-inch silicon wafers
Chip dimensions	3 x 3 mm
Gate length	10 μm
Gate width	$\geq 500 \mu\text{m}$
Gate structure	Silicon oxide / Silicon nitride (Standard)
Electrical Specifications	
Operational drain voltage, V_d	0.5 - 2.0 V
Operational drain current, I_d	0.1 - 1.0 mA
Transconductance, G_m	$> 0.5 \text{ mA} / \text{V}$
Threshold voltage, V_{th}	-2.0 – 1.0 V at pH 7 versus Ag/AgCl reference electrode
Leakage current, I_l	$< 10 \text{ nA}$
Chemical Specifications	
Sensitivity, S	$\geq 55 \text{ mV} / \text{pH}$
Linear range	1 - 13 pH
Accuracy	0.05 pH
Selectivity coefficients	$< 10^{-5}$ to alkaline metal ions
Long term drift	$\leq 1.0 \text{ mV/h}$ (after preconditioning)
Lifetime	> 8 months in continuous immersion at pH=7
Standard parameters for silicon nitride gate dielectric.	

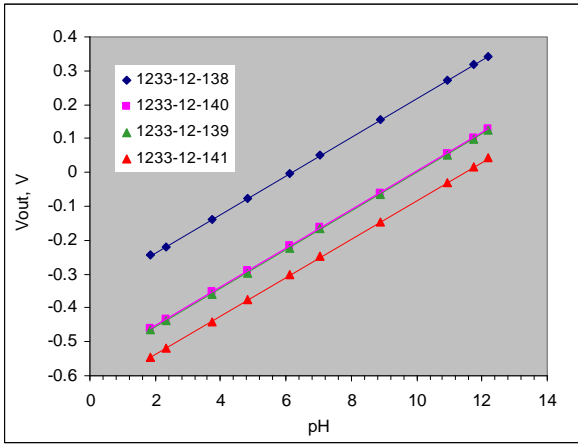


Figure 1. Calibration plots for several Si_3N_4 pH-ISFET (slope average: $56.8 \pm 0.1 \text{ mV } 7\text{pH}$)

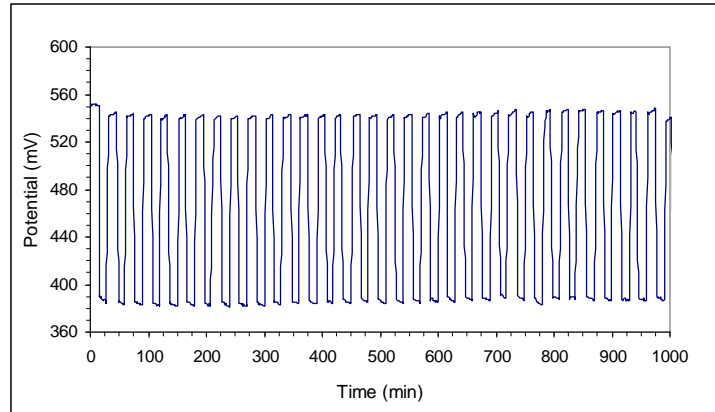


Figure 2. Study of pH-ISFET stability for pH 4 and 7 jumps.

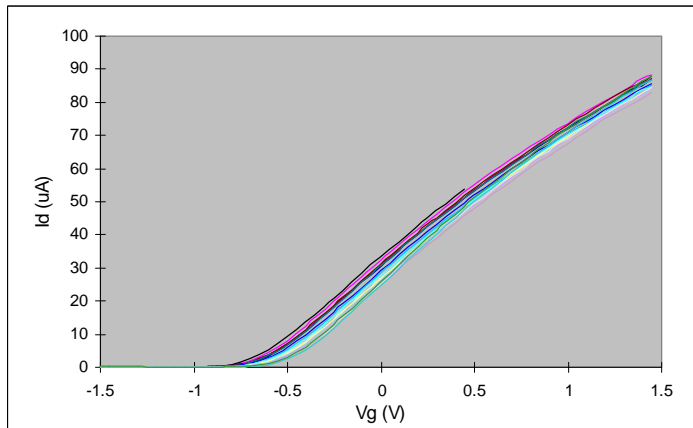


Figure 3. Current-voltage characteristics of a pH-ISFET measured at $V_D : 0.5 \text{ V}$ during 8 months immersed in aqueous solution.