List of Tables

Table	Title	Page
1.1	lattice parameters of III-N semiconductors for wurtzite structure	3
1.2	Values of different piezoelectric coefficients in wurtzite GaN and AlN as reported in the literature	8
1.3	Properties of substrate materials for AlGaN/GaN HEMT substrate choice	13
1.4	Standard guideline values for the maximum permissible limit of heavy metals ions in drinking water recommended by the WHO, EPA, and BIS	19
2.1	Parameters of Arora Model for GaN	38
2.2	Parameters of Transferred electron effect-2 model for Al _x Ga _{1-x} N	39
4.1	Extracted electrical parameters from the measured transfer characteristics of the HEMT device	76
5.1	Optimization of Recovery Time	87
5.2	Comparison of Proposed Sensor with Previously Reported Sensors	89
6.1	Detection of Pb ²⁺ Ions in Real Water Samples	96
6.2	Comparison of The Proposed Sensor with other Lead Ion Sensors	97
7.1	Concentration analysis of Hg ²⁺ ions	102
7.2	Reproducibility of the MoS₂ functionalized AlGaN/GaN HEMT	110
7.3	Comparison of different sensing techniques for Hg ²⁺ ion detection	112

