DECLARATION

I, hereby, declare that the thesis entitled ***Design of affordable SERS platform for detection and analysis of drugs in water and food matrices***, submitted to the School of Sciences, Tezpur University (TU), in partial fulfillment of the requirements for the award of the Doctor of Philosophy in Physics, has been carried out by me at the Department of Physics, TU, Assam, India-784028, under the supervision of ***Prof. Pabitra Nath*** (Supervisor). The contents of this work is original except where specific reference is made to the works of others and has not been submitted in whole or in part for consideration for any other degree or qualification in this or any other university or institute.

Dipjyoti Sarma

Date

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04/10/24

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This is to certify that the thesis entitled ***"Design of affordable SERS platform for detection and analysis of drugs in water and food matrices"***, submitted to the School of Sciences, Tezpur University in partial fulfillment for the award of degree of Doctor of Philosophy in Physics, is a record of research work carried out by **Dipjyoti Sarma** under my guidance and supervision.

All help received by her from various sources have been duly acknowledged. No part of this thesis has been submitted elsewhere for award of any other degree.

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List of abbreviations

AR	Antibiotic Resistance
AEF	Analytical Enhancement Factor
AgNP	Silver Nanoparticle
AUC	Area Under the Curve
AuNP	Gold Nanoparticle
AM	*aegle marmelos*
BPE	1,2-bis(4-pyridyl)ethylene
CARS	Coherent Antistokes Raman Spectroscopy
CCD	Charge Coupled Device
CEFTR	Ceftriaxone
CEF-Na	Ceftiofur Sodium
CE	Chemical Enhancement
CuNPs	Copper Nanoparticles
Cu-AuNPs	Bimetallic Copper-Gold Nanoparticles
Cu-ITO	CuNPs on Indium Tin Oxide
CVD	Chemical Vapor Deposition
DCH	Doxycycline Hydrochloride
DL	Deep Learning
DI	Deionized
DVD	Digital Versatile Disc
ED	Electrodeposition
EDTA	Ethylenediaminetetraacetic acid
EDX	Energy Dispersive X-ray
EF	Enhancement Factor
EM	Electromagnetic
ENX	Enrofloxacin
FESEM	Field Emission Scanning Electron Microscopy
FLU	Fluconazole
GC-MS	Gas Chromatography and Mass Spectrometry
GSM	Grams per Square Meter
HPLC	High-Performance Liquid Chromatography
ITO	Indium Tin Oxide
IR	Infrared
KHD	Kramer Heisenberg Dirac
K-NN	K-Nearest Neighbors
KSVM	kernel SVM

LC-MS	Liquid Chromatography and Mass Spectrometry
LIN	Lincomycin
LoD	Limit of Detection
LoQ	Limit of Quantification
LSPR	Localized Surface Plasmon Resonance
MG	Malachite Green
ML	Machine Learning
NIR	Near Infrared
NP	Nanoparticle
PCA	Principal Component Analysis
PLS	Partial Least Squares
PVA	Poly Vinyl Alcohol
PVD	Physical Vapor Deposition
PVP	Poly Vinyl Pyrrolidone
ppm	Parts Per Million
RBF	Radial Basis Function
ReLU	Rectified Linear Unit
ROC	Receiver Operating Characteristic
R6G	Rhodamine-6G
RSD	Relative Standard Deviation
SD	Standard Deviation
SPs	Surface Plasmons
SERS	Surface Enhanced Raman Spectroscopy
SFZ	Sulphamethoxazole
SVM	Support Vector Machine
TCH	Tetracycline Hydrochloride
TEM	Transmission Electron Microscopy
UV	Ultraviolet
WHO	World Health Organization
WOAH	World Organisation for Animal Health
XPS	X-ray Photoelectron Spectroscopy
XRD	X-ray Diffraction

Dedicated to my beloved Parents
Mina Kumari Goswami and Dibakar Sarma