Declaration

I hereby declare that the work presented in this thesis titled '*Organotin Assemblies Containing Sn-S and Sn-O Units: Applications in Resistive Switching Device and Antibacterial Properties*' submitted to the Indian Institute of Technology Jodhpur in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy, is a bonafide record of the research work carried out under the supervision of Dr. Ramesh K. Metre. The contents of this thesis in full or in parts, have not been submitted to, and will not be submitted by me to, any other Institute or University in India or abroad for the award of any degree or diploma.

Abhishek Mishra
P17CY001

Certificate

This is to certify that the thesis titled '*Organotin Assemblies Containing Sn-S and Sn-O Units: Applications in Resistive Switching Device and Antibacterial Properties*', submitted by Abhishek Mishra (P17CY001) to the Indian Institute of Technology Jodhpur for the award of the degree of Doctor of Philosophy, is a bonafide record of the research work done by him under my supervision. To the best of my knowledge, the contents of this report, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma.

Ramesh K. Metre
Ph. D. Thesis Supervisor
Date: 01/11/2022

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Abhishek Mishra
Ph.D. Student

List of Figures

List of Tables

List of Symbols

Symbol	*Description*
μ	Bridging
λ	Wavelength
κ	Kappa
δ	Chemical shift
V	Volume
°	Degree
%	Percentage
d	Interplanar distance
θ	Theta
η	Isobidentate bridging
ν	Frequency
A	Absorbance
I_0	Intensity of incident light
I	Intensity of transmitted light
l	Path length
ϵ	Molar extinction coefficient
c	Concentration
s	Second
h	Hour
τ	Addison's parameter
π	Pi
σ	Sigma
Å	Angstrom
I	Current
mV	Millivolt
mA	Miliampere
eV	Electron volt
1D	One-dimensional
2D	Two-dimensional

List of Abbreviations

Abbreviation	*Full form*
PVC	Polyvinyl Chloride
DNA	Deoxyribonucleic Acid
Fc	Ferrocene
NHC	N Heterocyclic Carbene
DD	Double-Decker
AD	Adamantane
TMEDA	Tetramethylethylenediamine
DTC	Dithiocarbamate
NLO	Non-linear optics
EFISH	Electric Field-Induced Second-Harmonic
EUVL	Extreme ultraviolet lithography
ITO	Indium Tin Oxide
MIM	Metal-insulator-metal
CVD	Chemical Vapor Diffusion
AACVD	Aerosol-Assisted Chemical Vapor Diffusion
PMMA	Poly(methyl methacrylate)
SC-XRD	Single-Crystal X-ray Diffraction
FTIR	Fourier Transform Infra-red
NMR	Nuclear Magnetic Resonance
UV	Ultra Violet
ESI-MS	Electron Spray Ionization Mass Spectrometry
TGA	Thermogravimetric Analysis
AFM	Atomic Force Microscopy
DCM	Dichloromethane
THF	Tetrahydrofuran
OLED	Organic light emitting diode
OFET	Organic field emitting transistor
CIF	Crystallographic information file
TD-DFT	Time-dependent density functional theory
DFT	Density functional theory
HOMO	Highly occupied molecular orbital
LUMO	Lowest Unoccupied molecular orbital
SOMO	Singly occupied molecular orbital
HRS	High resistive state
LRS	Low resistive state
RAM	Random-access memory
NDR	Negative differential resistance
SCLC	Space charge limited conduction
CPCM	Conductor-like Polarizable Calculation Model
NBO	Natural bonding orbital
AIM	Atom in molecules
NPA	Natural population analysis
ESP	Electrostatic Surface Potential
WBI	Wiberg bond index
TBP	Tetragonal Bipyramidal
Td	Tetrahedral
Oh	Octahedral
TP	Trigonal planer
PBP	Pentagonal Bipyramidal
LP	Lone pair
BCP	Bond critical points
ZOI	Zone of inhibition
DI	De-ionized
OCC	O-capped cluster