

Dedicated to My Beloved
Parents
Mr. Madhusudan Dhua & Mrs. Shikha Dhua
My Wife
Mrs. Puja Rakshit
and
My Supervisor
Prof. Poonam Mishra

Declaration by the Candidate

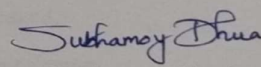
The candidate certifies that the thesis entitled “**Development of multiresponsive carbon dots based aerogel and its application in food analysis**” submitted to the *School of Engineering, Tezpur University* in partial fulfilment for the award of the degree of *Doctor of Philosophy* in the *Department of Food Engineering and Technology* is a record of research work carried out by me under the supervision of **Prof. Poonam Mishra**.

All assistance received from various sources have been duly acknowledged.

No part of this thesis has been submitted elsewhere for the award of any other degree.

Date: 14/11/2025

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Certificate of the Supervisor

This is to certify that the thesis entitled “**Development of multiresponsive carbon dots based aerogel and its application in food analysis**” submitted to the **School of Engineering**, Tezpur University in partial fulfillment for the award of the degree of Doctor of Philosophy in **Food Engineering and Technology** is a record of research work carried out by **Mr. Subhamoy Dhua** under my supervision and guidance.

All help received by him from various sources have been duly acknowledged.

No part of this thesis has been submitted elsewhere for award of any other degree.

Date: 14/11/25

Place: Tezpur

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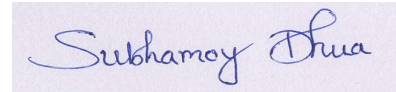
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List of Tables

Table 2.1 Polysaccharide based aerogel, their characteristics, and application.....	21-22
Table 2.2 Corn starch based aerogel, their characteristics, and application.....	23-24
Table 2.3 Protein based aerogel, their characteristics, and application.....	27
Table 2.4 Mucilage based aerogel, their characteristics, and application.....	30
Table 2.5 Hybrid/Composite food aerogel and their potential application.....	32-33
Table 2.6 Functional compound impregnated aerogel.....	37-40
Table 2.7 Carbon dots (CDs) based aerogel, their characteristics and application.....	57-59
Table 3.1 Thermal properties of aerogel.....	101
Table 4.1 Thermal properties of freeze and microwave dried aerogel.....	128
Table 4.2 Physico-functional and mechanical properties of standardized SCCO ₂ , freeze and microwave dried aerogel.....	134
Table 5.1 G/B values of crushed aerogel immersed in water and supernatant water.....	153
Table 6.1 The linearity and the uncertainty of measurement of the calibration curve.....	173
Table 6.2 Accuracy, precision, and % recovery of CDFA.....	174
Table 6.3 Comparison of formalin determination in fish fillets through CDFA and Acetylacetone method.....	175
Table 6.4 Comparison of formalin determination in raw fish through CDFA and Acetylacetone method.....	175

List of Figures

Fig. 2.1 Necessary steps involved in the development of aerogel.....	6
Fig. 2.2 Types of Aerogel.....	10
Fig. 2.3: Loading of functional compound at different stages of aerogel preparation.....	36
Fig. 2.4: Loading of carbon dots (CDs) at different stages of aerogel preparation.....	46
Fig. 3.1 Development of corn starch based aerogel.....	90
Fig. 3.2 Solvent exchange of hydrogel made of different starch concentrations.....	95
Fig. 3.3 Shrinkage during each stage of solvent transfer (a) and total shrinkage after solvent transfer and drying (b).....	96
Fig. 3.4 Density and porosity of the developed aerogel.....	96
Fig. 3.5 SEM images of control (a, & b), 5 % glycerol added (c & d) and 10 % glycerol added (e, & f) aerogel.....	97
Fig. 3.6 Recompressibility of control (0) and 5, 7.5, and 10 % glycerol added aerogel.....	99
Fig. 3.7 Recompressibility of control (0) and 5, 7.5, and 10 % glycerol added aerogel.....	99
Fig. 3.8 X-ray diffraction pattern and crystallinity index (CI) of control (0) and 5, 7.5, and 10 % glycerol added aerogel.....	100
Fig. 3. 9 Hygroscopicity of control (0) and 5, 7.5, and 10 % glycerol added aerogel.....	102
Fig. 3.10 Water absorption capacity at 30 min (WAC30 min) and 24 h (WAC24 h) of aerogel.....	103
Fig. 3.11 Reusability of control (0) and 5, 7.5, and 10 % glycerol added aerogel.....	104
Fig. 3.12 Principal component analysis (PCA) plot of characteristics of aerogel.....	105
Fig. 4.1 Developed aerogel through microwave drying at different power level.....	114
Fig. 4.2 Total shrinkage of the freeze and microwave dried aerogel.....	119
Fig. 4.3 Density and porosity of freeze dried (a) and microwave dried (b) aerogel.....	119
Fig. 4.4 SEM images of control (a, b, & c), 5 % glycerol added (d, e, & f) and 10 % glycerol added (g, h, & i) freeze dried aerogel.....	120-121
Fig. 4.5 SEM images of control (a, & b), 5 % glycerol added (c & d) and 10 % glycerol added (e, & f) microwave dried aerogel.....	121
Fig. 4.6 FESEM images of 5 % glycerol added (a, & b) and control (c & d) microwave dried aerogel.....	122
Fig. 4.7 Compressive strength (a and b) of control (0) and glycerol added (5, 7.5, & 10 %) freeze dried (FD) aerogel.....	124

Fig. 4.8 Compressive strength of control (0) and glycerol added (5, 7.5, & 10 %) microwave dried (MD) aerogel.....	124
Fig. 4.9 Recompressibility of control (0) and glycerol added (5, 7.5, & 10 %) freeze dried (FD) aerogel.....	125
Fig. 4.10 Recompressibility of control (0) and glycerol added (5, 7.5, & 10) microwave dried (MD) aerogel.....	125
Fig. 4.11 X-ray diffraction pattern and crystallinity index (CI) of control (0) and glycerol added (5, 7.5, & 10) freeze dried (FD) aerogel.....	127
Fig. 4.12 X-ray diffraction pattern and crystallinity index (CI) of control (0) and glycerol added (5, 7.5, & 10) microwave dried (MD) aerogel.....	127
Fig. 4.13 Hygroscopic behaviour of freeze dried (a) and microwave dried aerogel (b).....	129
Fig. 4.14 Water absorption capacity at 30 min (WAC30 min) and 24 h (WAC24 h) of freeze dried (a) and microwave dried aerogel (b).....	130
Fig. 4.15 Reusability of control (0) and 5, 7.5, & 10 % glycerol added freeze dried (FD) aerogel.....	131
Fig. 4.16 Reusability of control (0) and 5, 7.5, & 10 % glycerol added microwave dried (MD) aerogel.....	132
Fig. 4.17 Principal component analysis (PCA) bi-plot of the characteristics of freeze dried (FD) and microwave dried (MD) aerogel.....	133
Fig. 5.1 Development process of carbon dots (CDs) based aerogel.....	142
Fig. 5.2: Loading of different concentration of carbon dots (CDs) in aerogel.....	142
Fig. 5.3: Fluorescence spectra of CDs developed with ammonia (WA) (a) and without ammonia (WoA) (b).....	147
Fig. 5.4: Fluorescence behaviour (a) and FTIR spectra (b) of the developed CDs.....	148
Fig. 5.5: UV and fluorescence spectra of CDs solution (a) and fluorescence spectra at different concentration of CDs (b).....	149
Fig. 5.6: C-NMR spectra of CDs solution (a) and CDs precursor solution (b).....	150
Fig. 5.7: H-NMR spectra of CDs solution (a) and CDs precursor solution (b).....	150
Fig. 5.8: TEM images, particle size distribution (a) and SAED pattern (b) of CDs.....	151
Fig. 5.9: Appearance and fluorescence nature of the developed aerogel.....	152
Fig. 5.10: Loading value and G/B (green/blue) value (a) and fluorescence spectra (b) of the developed CDs based aerogel.....	153
Fig. 5.11: Cross-sectional images of transversally and vertically cut aerogel (a) and crushed carbon dots based aerogel (CDA) in water.....	153

Fig. 5.12: FTIR spectra of CS (corn starch), CA (control aerogel without CDs), CDA (CDs based aerogel), and CDS (carbon dots solution).....	154
Fig. 5.13: X-Ray diffraction pattern of CA (control aerogel without CDs) and CDA (CDs based aerogel).....	154-155
Fig. 5.14: DSC (differential scanning calorimetry) thermogram of CDs based aerogel.....	155
Fig. 5.15: Green/blue (G/B) value v/s pH relationship of CDs based aerogel.....	156
Fig. 6.1 Development process of carbon dots based functional aerogel (CDFA).....	165
Fig. 6.2 Common Carp (<i>Cyprinus carpio</i>) fish.....	169
Fig. 6.3 Fluorescence spectra (a) and fluorescence intensity (b) of CDs in the presence of Tollens reagent (TR).....	172
Fig. 6.4 Plot between intensity difference (B–B ₀) and concentration of FA (a) and images of CDs based aerogel (CDA) (left) and CDs based functional aerogel (CDFA) without (middle) and with FA (right).....	172
Fig. 6.5 Calibration curve of CDFA response to different formalin concentration.....	173

Abbreviations	Full Form
AA	Ascorbic Acid
AChE	Acetylcholinesterase Enzyme
AFM	Atomic Force Microscopy
AgNCs	Silver Nanoclusters
AgNPs	Silver Nanoparticles
ATCh	Acetylthiocholine
ATP	Adenosine Triphosphate
B	Blue Value
BD	Bulk Density
BET	Brunauer-Emmett-Teller
BPEI	Branched Polyethylenimine
BSM	Balangu seed mucilage
CDA	Carbon Dots based Aerogel
CDFA	Carbon Dots based Functional Aerogel
CDs	Carbon Dots
CI	Crystallinity Index
CMs	Carbon Microspheres
CNC	Cellulose Nano Crystals
CNF	Cellulose Nano Fibre
CQD	Carbon Quantum Dot
CV	Cyclic Voltammetry
D	Density
DDL	Diacetyldihydrolutidine
DE	Degree of Esterification
DMF	Dimethylformamide
DPPH	2,2-Diphenyl-1-Picrylhydrazyl
DSC	Differential Scanning Calorimetry
EDC	N-(3-Dimethylaminopropyl)-N'-Ethylcarbodiimide Hydrochloride
EDEA	2,2-(Ethylenedioxy)-bis-(Ethylamine)
EFSA	European Food Safety Authority
FA	Formalin

FD	Freeze Dried
FSSAI	Food Safety and Standard Authority of India
FT-IR	Fourier Transform Infrared Spectroscopy
G	Green Value
GA	Graphene Aerogel
GAE	Gallic Acid Equivalent
GCE	Glassy Carbon Electrode
GC-MS	Gas chromatography Mass Spectrometry
GO	Graphene Oxide
GRAS	Generally Recognized as Safe
HPLC	High Performance Liquid Chromatography
HRTEM	High-Resolution Transmission Electron Microscopy
IARC	International Agency for Research in Cancer
IBR	Intensity of Backscattered Radiation
IL	Ionic Liquid
IUPAC	International Union of Pure and Applied Chemistry
LED	Light Emitting Diode
LOD	Limit of Detection
LOQ	Limit of Quantification
MD	Microwave Dried
MPL	Maximum Permissible Limit
MTMS	Methyltrimethoxysilane
MW	Molecular Weight
NFC	Nanofibrillated Cellulose
NHS	N-Hydroxysuccinimide
NMMO	N-Methylmorpholine-N-Oxide
NMR	Nuclear Magnetic Resonance
OP	Organophosphate Pesticides
PCA	Principal Component Analysis
PDI	Polydispersity Index
PET	Photoinduced Electron Transfer
PL	Photo Luminescent
PMAA	Polymethacrylic Acid

PP	Polypropylene
PVA	Poly Vinyl Alcohol
QDs	Quantum Dots
QY	Quantum Yield
RLS	Resonance light scattering
RSD	Relative Standard Deviation
R²	Coefficient of Determination
SAED	Single Area Diffraction
SC	Supercritical
SCD	Supercritical CO ₂ Dried
SCE	Supercritical Extraction
SEM	scanning electron microscopy
SP	Soy Protein
SSA	Specific Surface Area
TBA	Tert-Butanol
TEM	Transmission Electron Microscopy
TEOS	Tetraethyl Orthosilicate
TMAO	Trimethylamine Oxide
TR	Tollens Reagent
TTA	Thenoyltrifluoroacetone
UV	Ultraviolet
VOC	Volatile Organic Compound
WAC	Water Absorption Capacity
WHO	World Health Organization
WLE	White Light Emitting
XRD	X-ray diffraction
YMBE	Yerba-Mate Based Extract
ε	Porosity
