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Development and Optimization of Liquid Crystalline Nanostructures for Enhanced Ocular Delivery

A Thesis submitted by

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for partial fulfillment of the requirements for

The Degree of Doctor of Philosophy

in Pharmaceutical Sciences

(Pharmaceutical Technology)

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*Development and Optimization of
Liquid Crystalline Nanostructures for
Enhanced Ocular Delivery*

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List of Abbreviations

AH	Aqueous humor
BAC	Benzalkonium chloride
BBB	Blood brain barrier
BQ	Bedaquiline
BQLC	BQ-loaded cubosome
CAM	Chorioallantoic membrane
CDs	Cyclodextrins
CLSM	Confocal laser scanning microscope
CPP	Critical packing parameter
cryo-TEM	Cryo-transmission electron microscopy
CXB	Celecoxib
Cys A	cyclosporin A
DADLE	[D-Ala2, D-Leu5] enkephalin
DEX	Dexamethasone
DLS	Dynamic light scattering
DSC	Differential scanning calorimetry
EE	Entrapment efficiency
EGFR	Epidermal growth factor receptor
EPR	Enhanced permeability and retention
FB	Flurbiprofen
FI	Finasteride
FP	Prostaglandin F receptor
GL-HCl	Glucosamine hydrochloride
GMO	Glyceryl monooleate
GRAS	Generally regarded as safe
h	hour
HET-CAM	Hen's egg test-chorioallantoic membrane test
HII	Inverse hexagonal mesophase
HPLC	High performance liquid chromatography

HR-TEM	High resolution transmission electron microscope
Im3m	Primitive cubic mesophases
IOP	Intraocular pressure
IPMS	Infinite periodic minimum surface
Jss	Steady state flux
KGy	Kilo gray
Kp	permeability coefficient
KZ	Ketoconazole
L3	Sponge phase
LC-MS-MS	Liquid chromatography–mass spectrometry- mass spectrometry
LCNs	Liquid crystalline nanostructures
LDA	Laser Doppler Anemometry
LLC	Lyotropic liquid crystals
MCT	Medium-chain triglycerides
min	minute
MO	Monoolein
MRI	Magnetic resonance imaging
NAD	Nicotinamide Adenine Dinucleotide
NFX	Norfloxacin
NPs	Nanoparticles
NS	Nano-sponge
NSCLC	Non-small cell lung cancer
Or	Oregano oil
P407	Poloxamer 407
PA	Peak area
PBS	Phosphate buffer saline
PD	Pharmacodynamics
PDI	Polydispersity index
PEG	Polyethylene glycol
PEO	Polyethylene oxide
PEs	Penetration enhancers

PET	Positron emission tomography
PFD	Pirfenidone
PG	Prostaglandin
PK	Pharmacokinetics
Pn3m	Double diamond cubic mesophases
PpIX	Photosensitizer protoporphyrin IX
PPO	Polypropylene oxide
PS	Particle size
PTX	paclitaxel
PYT	Phytantriol
QII	Inverse bicontinuous cubic mesophase
RhoB	Lissamine rhodamine
RI	Irritation index
RPE	retinal pigment epithelium
rpm	Round per minute
RSM	Response surface methodology
SAA	Surfactant
SAXS	Small-angle x-ray scattering
SIM	Simvastatin
SIM-CB	Simvastatin loaded cubosomes
SNEDDS	Self-nanoemulsifying drug delivery systems
SPECT	Single photo emission computed tomography
STZ	Sertaconazole nitrate
TET	Tetrandrine
TM	Timolol Maleate
TPGS	D- α -Tocopherol polyethylene glycol 1000 succinate
TRAVO	Travoprost
TRAVO-LCNs	Travoprost loaded liquid crystalline nanostructures
VAN	Vancomycin
XRPD	X-ray powder diffraction

ZP	Zeta potential
μm	Micrometer