

**SILICA
NANOPARTICLES
AS DRUG DELIVERY
SYSTEM FOR
IMMUNOMODULATOR
GMDP**

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Biomedical and Nanomedical Technologies (B&NT)

This **concise** monograph series focuses on the implementation of various engineering principles in the conception, design, development, analysis and operation of biomedical, biotechnological and nanotechnology systems and applications. The primary objective of the series is to compile the latest research topics in biomedical and nanomedical technologies, specifically devices and materials.

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ABSTRACT

The development of nanosystems for topical drug delivery to target cells is a promising tool to improve the drug therapeutic index. Transport systems can be designed to control the dispatch of the loaded drug to target areas, increasing its local concentration and bioavailability, while prolonging its retention, half-life and effectiveness. Therefore, such “smart” nano-devices are able to change radically the practice of therapy for a variety of diseases and disorders. The purpose of this book is to present the recent research development of nanoparticulate delivery systems for immune modulating agent, glucosaminyl muramyl dipeptides (N-acetylglucosaminyl-N-acetylmuramyl-L-alanyl-D-isoglutamine) or GMDP, which is the main component of bacterial wall with known target of action through NOD2 receptors, with an overlook to their applications for treatment of endometriosis, which often results in infertility. Silica-based nanoparticles have generated a significant amount of interest because of their inherent properties.

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NOMENCLATURE

AFM	atomic force microscopy
APTES	3-aminopropyl triethoxysilane
BBB	blood-brain barrier
BET	Brunauer-Emmett-Teller
BJH	Barrett-Joyner-Halenda
BRB	blood-retinal barrier
CD	cluster differentiation (CD14, CD45, CD11b, CD95, CD36, CD86, CD204)
Ct	cycle threshold method
D-Ala	D-alanine
D-Glu	D-glutamine
D-isoGln	D-isoglutamic acid
DNA	deoxyribonucleic acid
DSC	differential scanning calorimetry
EPR	enhanced permeability and retention effect
FCA	Freund's Complete Adjuvan
FITC	fluoresceine isothiocyanate
Fru	fructose
FTIR	Fourier transform infrared spectroscopy
GlcNAc	N-acetylglycosamine
GMDP	N-acetylglucosaminyl-N-acetylmuramyl-L-alanyl-D-isoglutamine
HSA	human serum albumin
IEP	isoelectric point
IFN γ	interferon γ
IgG	immunoglobulin
IL	interleukin
IUPAC	International Union of Pure and Applied Chemistry
Lymph	lymphocyte
Macroph	macrophage
MCM-41	Mobil Catalytic Material number 41
MDP	muramyl dipeptide
MMPs	matrix metalloproteinases
MTEOS	methyl triethoxysilane
MurNAc	N-acetylmuramic acid
NaCMC	carboxymethylcellulose sodium salt
NBT sp	spontaneous NBT-test
NBT st	zymozan-stimulated NBT-test
NOD2	nuclear-binding oligomerization domain 2
PCR	polymerase chain reaction method
PEG	poly (ethelene glycole)
PEI	polyethelenimine

x NOMENCLATURE

PolyG	a 10-mer polyguanylic acid
PVA	polyvinyl alcohol
RNA	ribonucleic acid
RPMI 1640	culture medium
SAXS	small-angle x-ray scattering
SHE	Syrian hamster embryo
SR-A, SR-B	scavenger receptors of A and B types
Suc	sucrose
TEOS	tetraethoxysilane
TDM	trehalose-dimycolates
TIMPs	tissue inhibitors of matrix metalloproteinases
UV-VIS	ultraviolet and visible spectroscopy