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Synthesis of ribitol phosphate based wall teichoic acids

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**Synthesis of Ribitol Phosphate based
Wall Teichoic acids**

Sara Ali

Synthesis of Ribitol Phosphate based Wall Teichoic acids

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. dr. ir. H. Bijl,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 10 februari 2022
klokke 15:00 uur

door

Sara Ali
geboren te Al-Najaf in 1990

PROMOTIECOMMISSIE

Promotoren: Prof. dr. G.A. van der Marel
Prof. dr. J.D.C. Codée

Overige leden: Prof. dr. H.S. Overkleef
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Prof. dr. N. van Sorge (AMC - UvA)
Prof. dr. C.H. Hokke (LUMC)
Prof. dr. A. Silipo (University of Naples Federico II)

It is well to give when asked,
but it is better to give unasked,
through understanding.

- *Khalil Gibran* -

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LIST OF ABBREVIATIONS

4FB-OSu	4-formylbenzoate <i>N</i> -hydroxysuccinimide ester
5-BTT	5-benzylthio-1 <i>H</i> -tetrazole
Ac	acetyl
ACN	acetonitrile
ADH	adipic acid dihydrazide
AgOTf	silver triflate
Ala	alanine
aq	aqueous
ASPS	automated solid phase synthesis
Bn	benzyl
BOP	benzotriazol-1-yl-oxy-tris-(dimethylamino)phosphonium hexafluorophosphate
BSA	bovine serum albumin
Bz	benzoyl
CAN	ceric ammonium nitrate
Cbz	carboxybenzyl
CDI	<i>C. difficile</i> infections
CNE	2-cyanoethyl
COD	1,5-cyclooctadiene
conc	concentrated
CPG	controlled pore glass
CRM ₁₉₇	cross-reacting material 197
CSO	(1 <i>S</i>)-(+)-(10-camphorsulfonyl)-oxaziridine
DAG	diacylglycerol
DBU	1,8-diazabicyclo[5.4.0]undec-7-ene
DCA	dichloroacetic acid
DCC	<i>N,N'</i> -Dicyclohexylcarbodiimide
DCI	4,5-dicyanoimidazole
DCM	dichloromethane
DDQ	2,3-dichloro-4,5-dicyano-1,4-benzoquinone
DIC	<i>N,N'</i> -Diisopropylcarbodiimide
DIPEA	<i>N,N</i> -diisopropylethylamine
DMAP	4-dimethylaminopyridine
DMF	dimethylformamide
DMSO	dimethylsulfoxide
DMTr	dimethoxytrityl
DSG	disuccinimidyl glutarate
EDAC	1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide

EDCI	1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide
EDTA	ethylenediaminetetraacetic acid
ELISA	enzyme-linked immunosorbent assay
eq	molar equivalents
Et ₂ O	diethyl ether
EtCN	propionitrile
EtOAc	ethyl acetate
ETT	5-ethylthio-1 <i>H</i> -tetrazole
F-Pse	perfluorooctylpropylsulfonyl ethyl
FA	Freund's adjuvant
Fmoc	fluorenylmethyloxycarbonyl
GalNAc	<i>N</i> -acetyl galactosamine
Glc	glucose
GlcNAc	<i>N</i> -acetyl glucosamine
GroP	glycerolphosphate
h	hour
HA	healthcare associated
HladM	detoxified α-hemolysin of <i>S. aureus</i>
hMNCs	human mononuclear cells
HPLC	High Performance Liquid Chromatography
HSA	human serum albumin
<i>i</i> -Pr	isopropyl
Ig	immunoglobulin
KLH	keyhole limpet hemocyanin
Lev	levulinoyl
LPS	lipopolysaccharide
LTA	lipoteichoic acid
MBL	mannose binding lectin
MeOH	methanol
MP	methoxyphenol
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
MS	molecular sieves
NaOMe	sodium methoxide
Nap	naphtyl
NMR	nuclear magnetic resonance
NIS	<i>N</i> -Iodosuccinimide
OPIA	opsonophagocytic killing inhibition assay
<i>p</i> -ToI ₃ Cl	<i>p</i> -toluenesulfonyl chloride
PBM	<i>para</i> -methoxybenzyl

PBS	phosphate-buffered saline
Ph	phenyl
Piv	pivaloyl
PMB	<i>para</i> -methoxybenzyl
PPTS	pyridinium <i>para</i> -toluenesulphonate
Prot	protein
PS	polysaccharides
PyBOP	benzotriazol-1-yl-oxytripyrrolidinophosphonium hexafluorophosphate
pyr	pyridine
quant	quantitative
RboP	ribitol phosphate
rEPA	recombinant exotoxin A from <i>Pseudomonas aeruginosa</i>
RP	reversed phase
rt	room temperature
sat	saturated
SLP	surface layer protein
sn	stereospecific numbering
TA	teichoic acid
Tar	teichoic acid ribitol
TBABr	tetrabutylammonium bromide
TBAF	tetrabutylammonium fluoride
TBDMS	<i>tert</i> -butyldimethylsilyl
TBDPS	<i>tert</i> -butyldiphenylsilyl
tBu	<i>tert</i> -butyl
TCA	trichloroacetyl
TEA	triethylamine
TES-H	triethylsilane
Tf ₂ O	trifluoromethansulfonic anhydride
TFA	trifluoroacetic acid
TfOH	trifluoromethansulfonic acid
THF	tetrahydrofuran
TMS	trimethylsilyl
Tol	<i>p</i> -toluene
Troc	2,2,2-trichloroethoxycarbonyl
Ts	<i>para</i> -toluenesulfonyl
TT	tetanus toxoid
TTBP	2,4,6-tris(<i>tert</i> -butyl)pyrimidine
UDP	uridine diphosphate
VRE	Vancomycin-resistant enterococcus
WTA	wall teichoic acid

