

DISSERTATION TITLE

AUTHOR’S NAME

SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

2025

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN

SIGNAL PROCESSING AND MACHINE LEARNING

2025

**Statement of Originality**

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Chapter 4 is published as D.T. Murphy, S. Schmid, J.R. Hester, P.E.R. Blanchard, and W. Miiller. Coordination site disorder in spinel-type LiMnTiO₄. Inorganic Chemistry 54, 4636-4643 (2015). DOI: 10.1021/ic502747p.

The contributions of the co-authors are as follows:

* A/Prof Schmid provided the initial project direction and edited the manuscript drafts.
* I prepared the manuscript drafts. The manuscript was revised by Dr Hester and Dr. Blanchard.
* I co-designed the study with A/Prof Siegbert Schmid and performed all the laboratory work at the School of Materials Science and Engineering and the Singapore Synchrotron Light Source. I also analyzed the data.
* All microscopy, including sample preparation, was conducted by me in the Facility for Analysis, Characterization, Testing and Simulation.
* Dr James Hester assisted in the collection of the neutron powder diffraction data.
* Dr Peter Blanchard assisted in the interpretation of the X-ray absorption spectroscopy data and carried out the spectral interpretation.
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The contributions of the co-authors are as follows:

* Prof Ting suggested the materials area and edited the manuscript drafts.
* I wrote the drafts of the manuscript. The manuscript was revised together with Dr. Sartbaeva and Dr. Yao.
* I performed all the materials synthesis, collected X-ray diffraction patterns and visible light spectra, carried transmission electron microscopy, and conducted data evaluation.
* Dr. Y. Fang conducted the Rietveld analysis of the powder X-ray diffraction data and single crystal structure determinations.
* Dr U. Hintermair conducted the molecular dynamics simulations.
* Ms. A. Sartbaeva prepared the samples for electron microscopy.

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# Abstract

Multihop cellular networks (MCNs) incorporate wireless ad hoc networking into traditional single-hop cellular networks (SCNs) and thus they enjoy the flexibility of ad hoc networks, while preserving the benefit of using infrastructure of SCNs. In this Thesis, we study the resource allocation problems in MCNs.

Xxxx …

# Acknowledgement (optional)

First of all, I would like to express my sincere thanks and great gratitude to my parents. ...

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# **Acronyms** (optional)

2G Second Generation

3G Third Generation

ACA Adaptive Channel Assignment

AP Access Point

ARS Ad-hoc Relaying Station

ASP Adaptive Switching Point

ATDMA Advanced Time Division Multiple Access

BS Base Station

CAMA Cellular Aided Mobile Ad-hoc Network

CBM Cellular Based Multihop Systems

CDD Code-Division Duplexing

D-PRMA Distributed PRMA

DA Demand Assignment

DCA Dynamic Channel Assignment

# Symbols (optional)

B channel bandwidth in Hz  
 C channel capacity in bps;

number of collisions in time slot t  
 d distance  
 D minimum reuse distanc

average message access delay  
 inter-datagram-arrival time  
 maximum tolerable delay for voice packets

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# Introduction

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This thesis deals with the problem of the blind multiuser detection detection for DS-CDMA ...

## 1.2 Objectives and Scopre

The communication channel considered in this thesis is assumed to be slow time-varying.

## 1.3 Organisations

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# (optional)

Table A-1 Example of uplink call combinations for state (8,2,1,2,1,3,2)

# (optional)

Table B-1 Example of downlink call combinations for state (24,2,1,2,1,3,2)