

Investigating Moiré Physics in 2D heterostructures using EMPAD detector:

A study of Charge Density Mapping

Sangers, J. (4645197)

Applied Physics - Master Thesis

TU Delft

2nd March 2023

Abstract

Contents

Table of Contents	ii
1 Introduction	1
2 Theory	2
2.1 TMDC/Crystal structure	2
2.2 Moiré	2
3 Methods	2
3.1 Mechanical transfer	2
3.2 TEM / EMPAD / EELS?	2
4 Results	2
References	3

1 Introduction

1. use of tmdc, QComp, optoelec
2. flat bands

2 Theory

2.1 TMDC/Crystal structure

1. crystal lattice
2. diffraction patter / reciprocal space

2.2 Moiré

1. moire pattern
2. mini brillouin zone
3. hybridisation and inter/intra transistions
4. band bending types, umklapp, flat bands

3 Methods

3.1 Mechanical transfer

3.2 TEM / EMPAD / EELS?

1. electron microscope workings
2. empad detector working / uses
3. CoM for electric and magnetic fields
4. Strain mapping

4 Results

References