

MASTER'S THESIS

Study on selectivity and tunability of organic photodetector

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**Study on Selectivity and Tunability of Organic
Photodetector**

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**A thesis submitted in partial fulfillment of the
requirements for the degree of**

Master of Philosophy

Principal Supervisor: Prof. K. W. Cheah

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Abstract

The aim of this MPhil project was to undertake a systematic study to develop various techniques to improve the performance of solution processed organic photodetectors. Both empirical and theoretical approaches were employed to optimize the sensitivity of organic photodetector. Preliminary study on factors affecting device time response were also conducted indicating the stability, dynamic response and device structure are interrelated. The main focus of this project was on developing device structures that could tune the selectivity and sensitivity of organic photodetectors.

An illustrative demonstration on the design and optimization process of incorporating an optical microcavity into the organic photodetector to tune the response spectrum as desired. Optimized device structures are fabricated with experimental results reveal that up to 8 times sensitivity enhancement was achieved as compared to the non cavity organic photodetector using the same blend system. Characteristic narrow peak shaped response spectra also demonstrated the strong spectral selectivity of OMPD compared to conventionally structured device. Electrical characterizations indicated all OMPDs to have comparable performance compared to other conventional device structures reported in the literature, confirming its usability.

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