UNIVERSITI TEKNOLOGI MARA

SYNTHESIS, ELECTRICAL AND OPTICAL PROPERTIES OF 5-INDOLINE-2,3-DIONE DERIVATIVES WITH Co(II), Ni(II), Cu(II) METAL COMPLEXES

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Thesis submitted in fulfilment
of the requirement for the degree of
Master of Science

Faculty of Applied Sciences

October 2014

CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel Examiners has met on 13th August 2014 to conduct the final examination of Muneera Fatin Binti Manan on his Master of Science thesis entitled "Synthesis, Electrical and Optical properties of 5-indoline-2,3-dione derivatives with Co(II), Ni(II), Cu(II) Metal Complexes" in accordance with the Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Unversiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for nay degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Thesis Title	:	Synthesis, Electrical and Optical properties of 5-indoline-2,3-dione derivatives with Co(II), Ni(II), Cu(II) Metal Complexes
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ABSTRACT

Molecular organic semiconductor has attracted much attention because of its easy to synthesize but it has a weakness in terms of solubility. To overcome, Schiff base ligands and their metal complexes have been selected to test their electrical conductivity values as they are soluble in most organic solvents, facile synthesis and variety of economical starting materials. Yet, until now there are few reports on Schiff base metal complexes that have such properties and the involvement of the effects of substituted group towards the electrical conductivity. In this study, nine Schiff base ligands abbreviated as L1 to L9 were synthesize from diketone precursors of isatin, 5-chloroisatin and 5-bromoisatin with different diamine. L1 to L3, L4 to L6 and L5 to L9 were derived from *o*-phenylenediamine, 4-nitro-*o*-phenylenediamine, and 4-chloro-*o*-phenylenediamine respectively. Six metal complexes which are CoL1, NiL1, CuL1, CoL2, CuL2 and CoL3 have been successfully synthesized. All the synthesized compounds were characterized by elemental analysis, NMR spectroscopy, Infrared spectroscopy, molar conductivity and magnetic susceptibility measurement. The Schiff base ligands behave as uninegatively charged bidendate ligands in metal complexes which coordinated to the metal via the azomethine nitrogen and the imino nitrogen atoms. Conductivity studies and the optical properties of these compounds were investigated to determine their conductivity value and energy band gap. The conductivity values obtained were placed between 10^{-5}-$10^{-8}\Omega^{-1}cm^{-1}$ which in the range of semiconductor compound and the energy band gap of current OLED material, AlQ_3 (2.70eV) has been selected as a standard value. Based on the result, L1 gives the lowest conductivity value ($5.3416\times10^{-8}\Omega^{-1}cm^{-1}$) and highest energy band gap (2.8826eV), while L5 gives highest conductivity value ($1.5596\times10^{-6}\Omega^{-1}cm^{-1}$) and lowest energy band gap (2.1903eV). L4 to L6 series gave high conductivity value and lowest energy band gap because the presence of nitro group. All metal complexes exhibit higher conductivity value and lower energy band gap compared with their respective Schiff base ligand. These findings present a beneficial basis to further apply in electronic industrial application as it will give a better or equivalence quality to improve the current semiconductor problems in terms of solubility and cost. Attempted works on synthesis of metal complexes from remaining Schiff base ligands were also reported.

ACKNOWLEDGEMENTS

I would like express my gratitude to my supervisor, Dr Karimah Kassim and co-supervisor, Encik Mohd Abdul Fatah Abdul Manan for guiding me throughout this research work as well as during writing thesis especially for constructive comments and faithful suggestions.

Also, I would like to thank to the Ministry of Higher Education Malaysia for Fundamental Research Grand Scheme for financing this research (FRGS/1/10/SG/UiTM/03/05). In addition, thanks to MyMaster scholarship, Skim Khidmat Siswazah and UiTM Postgraduate Teaching Assistant (UPTA) Scheme for the financial support to pursue my study.

Special appreciation for my dearest parents, Meena binti Ahmat and Manan bin Mat, my family members for their love and unfailing support. Not forgetting my colleagues especially from Coordination Chemistry Group (Muhamad Faridz Osman, Nur Illani Mohd Halim, Nor Zakiah Nor Hashim, Aliyin Abdul Ghani, Ahmad Fauzi Abu Bakar, Zailelah Zainoldin), Block G Lab (Norhanim Mohalid, Nurul Shulehaf Mansor), INTEC lab (Marlinda Musa, Abdul Hafiz, Nurul Huda), ASPS committee members, Muhammad Azri Abdul Aziz and many others for their friendship, assistance and helpful conversation. Very special thanks to Prof. Madya Dr Sharifah Aminah, Prof. Madya Dr Ahmad Saat, Prof. Madya Dr Zurina Shaameri, Dr Mohd Fazli Mohamad, Dr. Che Puteh Osman, Puan Sharifah Rohaiza Syed Omar, Puan Juhaida, Puan Musliha and Puan Zaleha for their assist, advice and guidance on completing this research. Most of all, I am grateful to God for blessing me with good health and a lot of perseverance, without which this work cannot be completed.

Finally, I would like to acknowledge Universiti Teknologi MARA (UiTM), Faculty of Applied Sciences, International Education College (INTEC) and Institute of Science (IOS) for research facilities.