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Analysis Of Foreign Matter Materials Related To The Die Attach Process Of Semiconductor Device Packaging

Tengku Elisa Bustaman

Perpustakaan Universiti Malaya
A509844959

Institute of Postgraduate Studies & Research

University of Malaya

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DECLARATION

I hereby declare that the work reported in this dissertation is my own, unless specified and duly acknowledged by quotation.

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(Tengku Elisa Bustaman)

PREFACE

The research on the effects of the foreign matter materials present at the die attach process of semiconductor device packaging on the device functionality was done in Motorola (M) Sdn. Bhd., Petaling Jaya. This study was in partial fulfillment of the degree of Master of Technology (Material Science).

In the University of Malaya, I was supervised by Professor S. Radhakrishna from the Institute of Postgraduate Studies and Research and was co-supervised by Dr. Aziz Hassan from the Chemistry Department from 1996 to 1998. When Professor S. Radhakrishna ended his tenure with the university in 1998, Dr. Aziz Hassan took over the supervisory duties with Associate Professor Dr Alias Daud as co-supervisor.

While in Motorola (M) Sdn Bhd, I was advised by Engineering Manager of the Hermetic Department, Ms. LC Tan.

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ABSTRACT

The purpose of this study is to investigate the effects of the presence of foreign matter (FM) that appears during the die attach process of semiconductor device packaging on the functionality of semiconductor devices (devices). This study also covers the investigation on sources of FM, and suggests methods of reducing the presence of FM during the die attach process of devices. Actual in-process rejects were collected to categorize the different types of FM and to quantify the actual impact of the different FM categories on device manufacturing yield. Some of these rejects were sent for electrical testing to determine whether FM adversely affects the end-functionality of a device. This study concluded that the presence of FM did not adversely affect the end-functionality of a device. Some of the rejects were sent for elemental analysis to determine whether the FM types seen were of conductive material that would produce adverse effects on the end-functionality of a device. Analysis done showed that the FM consists of non-conductive Carbon elements. Simulations were also conducted to determine the sources of FM. FM sources identification allows us to suggest methods of reducing the presence of FM. With the results of this study, the reject criteria for FM in Motorola (M) Sdn. Bhd. had been revised and the preventive action taken has reduced the amount of FM found at the die attach process, thus improving the manufacturing yield of the semiconductor devices.

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