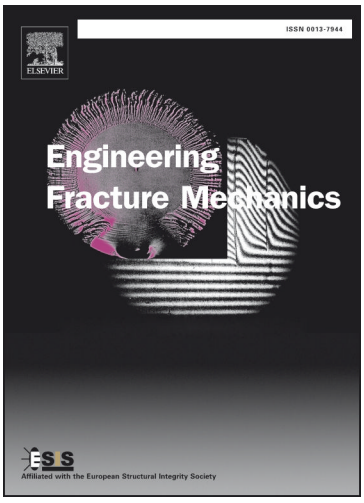

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Effect of thermal misfit stress on steam-driven delamination in electronic packages

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Abstract

In this study, circular interfacial defects or delaminations between the die-attach layer and the substrate in electronic packages are analytically modeled to investigate the effect of thermal misfit stress on the steam-driven delamination during the solder reflow process. Based on Love-Kirchhoff plate theory, analytical solutions of strain energy and strain energy release rate of circular delaminations under the combined action of steam pressure and thermal stress are derived. By comparing the energy release rate of circular delamination under steam pressure with and without thermal stress, the contribution of thermal stress to the strain energy release rate is assessed quantitatively. Further, the contribution of thermal stress to the extension of elliptic delaminations is studied numerically. This study brings new understanding on the role that thermal stress plays in facilitating steam-driven delamination during the solder reflow process in electronic packages.

Keywords: steam-driven delamination, thermal misfit stress, strain energy release rate, microelectronic packaging

1. Introduction

Polymeric materials have been widely used in microelectronic packaging as encapsulant due to their excellent electric properties, good chemical resistance, and easy molding formability [1].

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