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FABRICATION AND CHARACTERIZATION OF AN EPOXY-FREE OPTICAL FILTER STRUCTURE FOR OPTICAL COMMUNICATION NETWORK APPLICATIONS

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Abstract

Wavelength Division Multiplexing (WDM) optical filters are key components in optical communication systems. This study proposes an epoxy-free optical filter packaging method using low-temperature solder bonding to improve the durability and reliability of conventional epoxy-based structures. The fabrication process includes ferrule polishing, active optical alignment, and solder bonding while monitoring optical characteristics in real time. The fabricated 1535 nm DWDM filter exhibited a pass-channel insertion loss of ≤0.8 dB, a reflect-channel insertion loss of ≤0.6 dB, and a return loss of ≥45 dB, demonstrating performance comparable to conventional epoxy-packaged devices. These results indicate that the proposed epoxy-free packaging technology is a promising solution for improving the reliability of WDM optical modules.

Keywords:
WDM, Optical Filter, Epoxy-Free Packaging, Solder Bonding, DWDM