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PERMANENT METALLIC BONDING METHOD

Abstract

A laser device is bonded to a diamond submount (20) by means of a procedure including (1) codepositing an auxiliary layer (22), on a layer of barrier metal (21) that has been deposited overlying the submount, followed by (2) depositing a wetting layer (23) on the auxiliary layer, and (3) by depositing a solder layer (24) comprising alternating metallic layers, preferably of gold and tin sufficient to form an overall tin-rich gold-tin eutectic composition. The barrier metal is typically W, Mo, Cr, or Ru. Prior to bonding, a conventional metallization such as Ti-Pt-Au (three layers) is deposited on the laser device's bottom ohmic contact, typically comprising Ge. Then, during bonding, the solder layer is brought into physical contact with the laser device's metallization under enough heat and pressure, followed by cooling, to form a permanent joint between them. The thickness of the solder layer is advantageously less than approximately 5 μm . The wetting layer is preferably the intermetallic compound Ni_3Sn_4 , and the auxiliary layer is formed by codepositing the metallic components of this intermetallic together with the barrier metal.

FIGURE 1.