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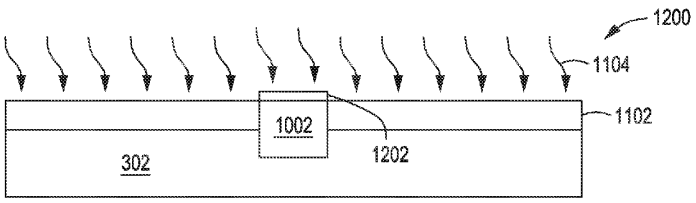


FIG. 12

(57) Abstract: A method for processing a substrate for hybrid bonding that includes doping an aluminum oxide (Al_2O_3) layer prior to bonding of the substrate. A method may include forming an aluminum oxide layer with a metal dopant to form a doped aluminum oxide layer on the substrate where the doped aluminum oxide forms a bonding layer for a hybrid bonding process on an uppermost surface of the substrate. A metal contact is formed on the substrate that penetrates through the doped aluminum oxide layer and a chemical mechanical polish (CMP) process is performed to recess an uppermost surface of the metal contact below a surface of the doped aluminum oxide layer.

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