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(54) **BONDING THERMOPLASTIC POLYMERS**

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(58) **Field of Classification Search** 156/183, 156/308.6
See application file for complete search history.

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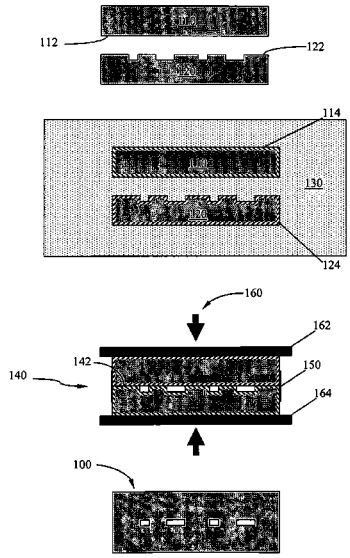
(57) **ABSTRACT**

We demonstrate a new method for joining patterned thermoplastic parts into layered structures. The method takes advantage of case-II permeant diffusion to generate dimensionally controlled, activated bonding layers at the surfaces being joined. It is capable of producing bonds characterized by cohesive failure while preserving the fidelity of patterned features in the bonding surfaces. This approach is uniquely suited to production of microfluidic multilayer structures, as it allows the bond-forming interface between plastic parts to be precisely manipulated at micrometer length scales. The bond enhancing procedure is easily integrated in standard process flows and requires no specialized equipment.

10 Claims, 8 Drawing Sheets