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(54) **REVERSABLE ATTACHMENT SYSTEM**

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ABSTRACT

A reversible attachment system includes an adhesion layer, an inter-substrate bond structure, a mating layer and an extension actuator. The adhesion layer is configured to attach to a first substrate. The inter-substrate bond structure is coupled to the adhesion layer. The mating layer is configured to attach to a second substrate. The extension actuator is configured to attach to the second substrate and expand in response to an absorption of a gas. The inter-substrate bond structure is configured to form an initial thermocompression bond with the mating layer in response to an applied pressure and an applied heat. The expansion of the extension actuator in response to absorbing the gas detaches the inter-substrate bond structure from the mating layer.

