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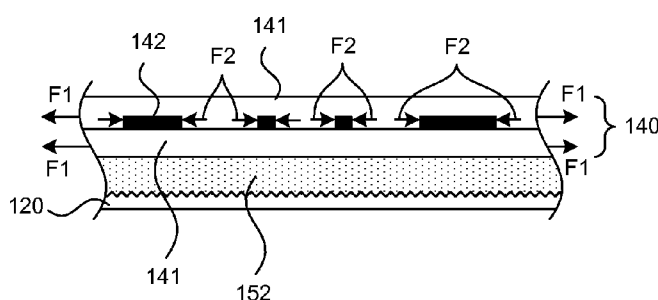


FIG. 6A

(57) Abstract: Solid state lighting devices with selected thermal expansion and/or surface characteristics, and associated methods are disclosed. A method in accordance with a particular embodiment includes forming an SSL (solid state lighting) formation structure having a formation structure coefficient of thermal expansion (CTE), selecting a first material of an interlayer structure to have a first material CTE greater than the substrate CTE, and selecting a second material of the interlayer structure based at least in part on the second material having a second material CTE less than the first material CTE. The method can further include forming the interlayer structure over the SSL formation structure by disposing (at least) a first layer of the first material over the SSL formation structure, a portion of the second material over the first material, and a second layer of the first material over the second material. The SSL formation structure supports an SSL emitter material, and the method further includes counteracting a force placed on the formation structure by the first material, by virtue of the difference between the second material CTE and the first material CTE. In other embodiments, the SSL formation structure can have an off-cut angle with a non-zero value of up to about 4.5 degrees.