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(57) **ABSTRACT**

A semiconductor device includes a substrate, a buffer layer disposed on the substrate, a channel layer disposed on the buffer layer, a barrier layer disposed on the buffer layer, and a passivation layer disposed on the barrier layer. The semiconductor device further includes a device isolation region that extends through the passivation layer, the barrier layer, and at least a portion of the channel layer, and encloses a first device region of the semiconductor device. A damage concentration of the device isolation region varies along a depth direction, and is highest near a junction between the barrier layer and the channel layer.

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