

ABSTRACT

Semiconductor devices are provided. A semiconductor device includes a substrate and a gate structure on the substrate. The semiconductor device includes a channel on the substrate. The semiconductor device includes a source/drain layer on the channel. Moreover, the semiconductor device includes a spacer on a sidewall of the gate structure. The spacer includes a central portion overlapping the channel in a vertical direction, and a protrusion portion protruding from the central portion. Related methods of manufacturing semiconductor devices are also provided.

FIG. 2