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PARK et al.

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ABSTRACT

A semiconductor device includes a structure including a conductive region, and a capacitor electrically connected to the conductive region of the structure. The capacitor includes a first electrode electrically connected to the conductive region, a second electrode on the first electrode, and a dielectric layer between the first electrode and the second electrode. At least one of the first electrode and the second electrode includes a first material layer including a first material region including a first crystalline region and a second crystalline region different from the first crystalline region, and a second material region between the first crystalline region and the second crystalline region, and a second material layer on the first material layer. At least a portion of the first material layer is between the second material layer and the dielectric layer. A material of the first material region is different from a material of the second material region.

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