ABSTRACT

A semiconductor device includes a lower structure, first electrodes spaced apart from each other on the lower structure, a second electrode on the first electrodes, and a dielectric layer between the first electrodes and the second electrode. Each of the first electrodes includes a first element, a second element, and nitrogen (N). A degree of stiffness of a first nitride material including the first element is higher than a degree of stiffness of a second nitride material including the second element. Each of the first electrodes includes a region in which a ratio of a concentration of the first element in the region to a concentration of the second element in the region decreases in a horizontal direction, away from a side surface of each of the first electrodes.

FIG. 3A