

[ABSTRACT]

According to the present invention, there is provided a technique capable of improving electrical characteristics of a semiconductor device. According to the present invention, there is provided a method of manufacturing a semiconductor device including: a step of generating an oxygen active species and a hydrogen active species by exciting a process gas containing an oxygen-containing gas and a hydrogen-containing gas; and a step of forming an oxide layer by supplying the oxygen active species and the hydrogen active species to a substrate with a concave structure formed thereon to subject a film formed on an inner surface of the concave structure to oxidation from a surface of the film, wherein the oxide layer is formed in the step of forming the oxide layer such that a thickness of the oxide layer on the inner surface of the concave structure is greater than that of the oxide layer at an upper end portion of the concave structure by setting a ratio of a flow rate of the hydrogen active species to a total flow rate of the oxygen active species and the hydrogen active species supplied to the substrate to a predetermined ratio greater than a first ratio at which a rate of forming the oxide layer is maximized at the upper end portion of the concave structure.