

FERROELECTRIC CAPACITOR, FERROELECTRIC MEMORY DEVICE,
AND THEIR MANUFACTURING METHOD

ABSTRACT

The purpose of this invention is to provide a ferroelectric capacitor and a ferroelectric memory device, which: can perform stable operation without causing a resistivity change that is considered to be caused due to the leakage current and the oxygen diffusion; [in which] it is difficult for dielectric fatigue to be caused in the ferroelectric capacitor, even by repeated inversions; and [in which] long life and high reliability can be maintained; and [to provide] their manufacturing method. The constitution of this invention includes a ferroelectric capacitor CAP which has IR lower electrode 13, PZT thin film 14, and Ir upper electrode 15 and in which crystal grain layers 14a, 14b, and 14c constituted by assembling crystal grains 50a, 50b, and 50c by means of grain boundaries 51a, 51b, and 51c are laminated by means of grain boundaries 52A and 52B along the surface of the Ir electrode 13, so that the ferroelectric film 14 is formed. A method for manufacturing the ferroelectric capacitor CAP, which meets all of the important conditions of (1) selection of an optimum electrode substance such as Ir; (2) control of crystal growth direction by means of TiO_x nucleus attachment and a surplus of Pb; and (3) optimum annealing temperature for eliminating surface precipitates; [and which] deposits a titanium oxide, forms a ferroelectric film material layer containing a surplus of lead on it, heats it at a temperature at which the surface precipitates are substantially lost, and laminates each crystal grain layer 14a, 14b, and 14c by repeating the above processes.

Figure 1