



US006852593B2

(12) **United States Patent**
Basceri et al.

(10) **Patent No.:** **US 6,852,593 B2**
(45) **Date of Patent:** **Feb. 8, 2005**

(54) **HAZE-FREE BST FILMS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/614,489**

(22) Filed: **Jul. 3, 2003**

(65) **Prior Publication Data**

US 2004/0063335 A1 Apr. 1, 2004

Related U.S. Application Data

(62) Division of application No. 09/971,945, filed on Oct. 4, 2001, now Pat. No. 6,660,535, which is a continuation of application No. 09/382,753, filed on Aug. 25, 1999, now Pat. No. 6,319,764.

(51) **Int. Cl.**⁷ **H01L 21/8242**

(52) **U.S. Cl.** **438/253; 257/306**

(58) **Field of Search** 438/238-240,
438/253; 257/295, 306

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(57) **ABSTRACT**

Described herein is a method for producing a haze-free (Ba, Sr)TiO₃ (BST) film, and devices incorporating the same. In one embodiment, the BST film is made haze-free by depositing the film with a substantially uniform desired crystal orientation, for example, {100}, preferably by forming the film by metal-organic chemical vapor deposition at a temperature greater than about 580° C. at a rate of less than about 80 Å/min, to result in a film having about 50 to 53.5 atomic percent titanium. In another embodiment, where the BST film serves as a capacitor for a DRAM memory cell, a desired {100} orientation is induced by depositing the bottom electrode over a nucleation layer of NiO, which gives the bottom electrode a preferential {100} orientation. BST is then grown over the {100} oriented bottom electrode also with a {100} orientation. A nucleation layer of materials such as Ti, Nb and Mn can also be provided over the bottom electrode and beneath the BST film to induce smooth, haze-free BST growth. Haze-free BST film can also be favored by forming the bottom electrode at high temperatures close to those used for BST deposition, and without a vacuum break between the bottom electrode and BST deposition.

15 Claims, 5 Drawing Sheets

