



US008288767B2

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

(10) **Patent No.:** **US 8,288,767 B2**  
(45) **Date of Patent:** **Oct. 16, 2012**

(54) **THIN-FILM TRANSISTOR AND FORMING METHOD THEREOF**

(75) Inventors: **Ching-Fuh Lin**, Taipei (TW); **Chun-Yu Lee**, Taipei (TW)

(73) Assignee: **National Taiwan University**, Taipei (TW)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 390 days.

(21) Appl. No.: **12/651,992**

(22) Filed: **Jan. 4, 2010**

(65) **Prior Publication Data**

US 2011/0163307 A1 Jul. 7, 2011

(51) **Int. Cl.**  
**H01L 29/10** (2006.01)

(52) **U.S. Cl.** ... **257/43**; 257/410; 257/642; 257/E21.007; 438/85; 438/104; 438/754

(58) **Field of Classification Search** ..... None  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,232,157 B1 \* 5/2001 Dodabalapur et al. .... 438/158  
2004/0056251 A1 3/2004 Kim et al.

2006/0043447 A1 3/2006 Ishii et al.  
2006/0284171 A1 \* 12/2006 Levy et al. .... 438/104  
2007/0077681 A1 \* 4/2007 Dotz et al. .... 438/99  
2008/0057631 A1 3/2008 Cheng et al.  
2009/0127552 A1 \* 5/2009 Li et al. .... 257/43  
2009/0206341 A1 8/2009 Marks et al.

FOREIGN PATENT DOCUMENTS

TW 1309050 4/2009

\* cited by examiner

*Primary Examiner* — Benjamin Sandvik

*Assistant Examiner* — Scott R Wilson

(74) *Attorney, Agent, or Firm* — Stout, Uxa, Buyan & Mullins, LLP

(57) **ABSTRACT**

A method for forming a thin-film transistor (TFT) includes providing a substrate, forming a first patterned conducting layer on the substrate, forming an organic dielectric layer on the first patterned conducting layer and the substrate, forming a seeding layer on the organic dielectric layer, using the seeding layer as a crystal growing base to form an inorganic semiconductor layer on the seeding layer, and forming a second patterned conducting layer on the inorganic semiconductor layer.

**22 Claims, 4 Drawing Sheets**

