patterned adhesion enhancement layer and a patterned copper-bearing metal layer respectively.

**17 Claims, 3 Drawing Sheets**

(51) **Int. Cl.**

| | |
|---|---|
| ***H01L 29/423*** | (2006.01) |
| ***H01L 29/49*** | (2006.01) |
| ***H01L 29/66*** | (2006.01) |
| ***G02F 1/1343*** | (2006.01) |
| ***G02F 1/1362*** | (2006.01) |
| ***H01L 21/027*** | (2006.01) |
| ***H01L 21/4763*** | (2006.01) |
| ***H01L 29/45*** | (2006.01) |
| ***H01L 29/786*** | (2006.01) |

(52) **U.S. Cl.**
CPC .... ***H01L 21/0274*** (2013.01); ***H01L 21/47635*** (2013.01); ***H01L 27/124*** (2013.01); ***H01L 27/1225*** (2013.01); ***H01L 29/42356*** (2013.01); ***H01L 29/42384*** (2013.01); ***H01L 29/45*** (2013.01); ***H01L 29/495*** (2013.01); ***H01L 29/4908*** (2013.01); ***H01L 29/66765*** (2013.01); ***H01L 29/7869*** (2013.01); *G02F 2001/136295* (2013.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0181610 A1 8/2005 Sasagawa et al.
2007/0013077 A1* 1/2007 Lee ..... H01L 23/53238 257/762
2007/0284336 A1 12/2007 Hamada et al.
2008/0138942 A1 6/2008 Lee et al.
2009/0233388 A1* 9/2009 Kwon ..... H01L 29/458 438/22
2010/0051934 A1 3/2010 Choung et al.
2011/0068402 A1* 3/2011 Takasawa ..... C23C 14/0057 257/347
2011/0133193 A1* 6/2011 Song ..... H01L 27/12 257/59
2014/0014952 A1* 1/2014 Katsui ..... H01L 29/41733 257/43

FOREIGN PATENT DOCUMENTS

CN 101192527 A 6/2008
CN 101424836 A 5/2009
CN 101425476 A 5/2009
CN 101971350 A 2/2011
CN 103295970 A 9/2013
JP 07-211697 A 8/1995
JP 2000-252283 A 9/2000

OTHER PUBLICATIONS

Second Office Action and Search Report issued by Chinese Patent Office for priority Chinese application 201310222271.7 dated Jan. 12, 2015 with English translation.
International Search Report and Written Opinion issued by Chinese Patent Office, acting as the International Searching Authority, for International Application PCT/CN2013/086741 mailed Mar. 20, 2014 with English translation of Written Opinion.

* cited by examiner