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(54) **OXIDE SPUTTERING TARGET, AND THIN FILM TRANSISTOR USING THE SAME**

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CPC ***H01L 29/7869*** (2013.01); ***H01J 37/3429*** (2013.01); ***H01J 37/3491*** (2013.01)

(58) **Field of Classification Search**
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USPC 257/43; 204/298.13
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0099140 A1* 5/2006 Abe C04B 35/01 423/594.13
2010/0155717 A1* 6/2010 Yano C23C 14/086 257/43
2014/0102877 A1* 4/2014 Yamazaki C30B 23/005 204/192.15

FOREIGN PATENT DOCUMENTS

JP	2008-192721	8/2008
JP	2008-214697	9/2008
KR	10-2013-0018300	2/2013
KR	10-2013-0097809	9/2013
KR	10-2013-0102628	9/2013

* cited by examiner

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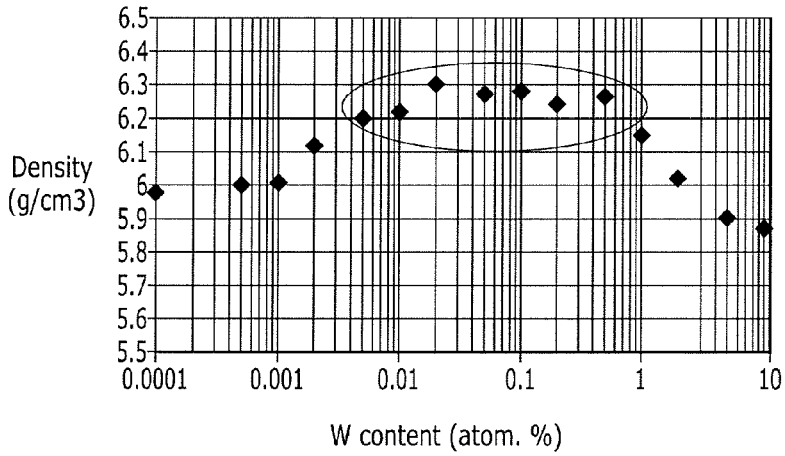
(57) **ABSTRACT**

An oxide sputtering target includes at least one of indium (In), zinc (Zn), tin (Sn), and gallium (Ga), and tungsten (W) in an amount from 0.005 mol % to 1 mol %.

4 Claims, 11 Drawing Sheets