2008.10.27

ULVAC and Mitsubishi Materials Corporation jointly developed new TFT wiring technology
- New copper alloy target adopted to the new sputtering technology -

ULVAC, Inc.
Mitsubishi Materials Corporation

ULVAC, Inc. (hereinafter "ULVAC;" President and CEO: Hidenori Suwa; headquarters: Chigasaki City, Kanagawa, Japan) and Mitsubishi Materials Corporation (hereinafter "Mitsubishi Materials;" President: Akihiko Ide; headquarters: Chiyoda-ku, Tokyo, Japan) announce their joint development and commercialization of a copper (Cu) alloy target to be used for the wiring of TFTs (thin film transistors) for slimline large screen TVs. With this development, the copper wiring process becomes available with low resistance and also at low cost without using expensive molybdenum (Mo), by using a Cu-Ca base and improved Cu-Mg base copper alloy materials developed by Mitsubishi Materials, together with the oxygen mix sputtering technology developed by ULVAC.
The copper wiring process using the new copper alloy target materials is exhibited at the ULVAC exhibition booth at FPD International 2008 held at Pacifico Yokohama from October 29.

[Background]
These days, due to increases in the size of TFT panels, low-resistance aluminum (Al) base wiring is now widely used on the Mo under-layer, while together with the recent increase in popularity of large screen TVs the need for copper base wiring has been increasing in order to further reduce the resistance of TFT panel wiring and reduce the cost of panels.
Using copper base wiring in TFT panels leads to the problem of low adhesion to glass substrates and under-layers. There are also other problems such as the difficulty in compatibility between material prices and process workability when using Mo base or titanium (Ti) base materials that are generally used as the barrier metal layer, since Al base wiring is conventionally used to maintain the required properties, including adhesion. All of these problems have been contributing to increases in costs.

[Oxygen Mix Sputtering Technology]
In February 2008, ULVAC announced its technology for forming under-layers by oxygen mix sputtering using Cu base alloy targets. This technology enabled low-resistance wiring to be obtained that had good adhesion and barrier capabilities with regard to glass substrates and under-layers. Further, a low resistance and low cost copper wiring process became available without the need for Mo base or Ti base barrier metal layers. However, in recent TFT processes, a hydrogen plasma process may be carried out after the formation of the source/drain electrodes, and employing Cu base alloy targets that have been used until now may reduce the oxides formed on the interface due to hydrogen plasma, inhibiting optimal adhesion in some cases.

[Features of the New Copper Alloy Target Materials]
Now, Mitsubishi Materials and ULVAC have developed new copper alloy target materials with good resistance to the hydrogen plasma process carried out after source/drain formation in the TFT process, Cu-Ca base copper alloy and Cu-Mg base copper alloy, and special manufacturing technology. The oxygen mix sputtering film deposited using the newly developed Cu-Ca base copper alloy and Cu-Mg base copper alloy materials allows for good adhesion and barrier capability with a stable mixed oxide layer formed on the interface to the under-layer without being reduced by hydrogen plasma.

[Features of the Copper Wiring Process Using the New Technology]
Using ULVAC's oxygen mix sputtering technology and the copper alloy target described above employing the new copper alloy materials developed by Mitsubishi Materials enables copper wiring processes with qualities such as those shown below:

(1) Low cost
(2) Low resistance
(3) Good adhesion to glass substrates or under-layers
(4) Good barrier capability to silicone base under-layers
(5) Easy wet etching (etching possible using one liquid)
(6) Good electrical contact with ITO (indium tin oxide)
(7) Good resistance to the subsequent hydrogen plasma process

[Future Plans]
Until now, ULVAC sold TFT wiring sputtering film formation systems and ULVAC Materials, Inc. (hereinafter "ULVAC Materials") sold targets to FPD makers and other relevant customers in and outside Japan.
On the other hand, Mitsubishi Materials Group is a world top-class manufacturer of high-performance anoxic copper and of the alloys used in the copper working industry. The new copper alloy wiring processes announced here that use various types of Cu alloy materials, Cu-Ca base and improved Cu-Mg base, are manufactured by Mitsubishi Materials Group (Mitsubishi Materials Corporation and Mitsubishi Shindoh Co., Ltd.). ULVAC processes these materials into targets, which are sold by ULVAC Materials.

The market is estimated to need 1,000 tons or more annually of Al target materials for TFT panel wiring in 2010. 5% of this is expected to replace Cu wiring targets in 2010, and this figure will rise to approximately 30% in 2012. Therefore, ULVAC, Mitsubishi Materials, and ULVAC Materials will pursue this manufacturing in accordance with market needs. As for the announced new copper alloy targets, ULVAC Materials expects sales of 100 million yen in the first year, and 500 million yen after three years.
By developing this new Cu wiring process and introducing these new Cu alloy target materials into the market, ULVAC, ULVAC Materials, and Mitsubishi Materials will endeavor to enable you to maintain high productivity and cost reductions, to produce and deliver high-value-added products, and to expand your performance.

<Enquiries from customers regarding this announcement>

Flat Panel Display Equipment Group, ULVAC, Inc.
East Japan Sales Department TEL: +81-3-5218-5704
West Japan sales Department TEL: +81-6-6397-2283
ULVAC Materials, Inc.
Electronic Materials Department, Corporate Sales Division TEL: +81-3-5218-6021

・Websites
ULVAC, Inc. http://www.ulvac.co.jp/