高移動度酸化物半導体スパッタリングターゲット

Sputtering Target of High-mobility Oxide Semiconductor

コベルコの独自酸化物半導体材料 (製品名：KOS-B03C) の特徴
Feature of KOBELCO oxide semiconductor material (Product name : KOS-B03C)

特 長　Features

- **KOS-B03C は a-Si, IGZO よりも高電子移動度**
  酸化物半導体トランジスタの小型化を実現
- **低温プロセス (350℃) に対応**
  バックエンド工程中にトランジスタ形成が可能
- **DC スパッタ成膜が可能なワイドバンドギャップ材料**
  透明フィルム上に透明なトランジスタ形成が可能
- **低リーク電流のトランジスタ形成が可能**
  結晶 Si と酸化物半導体トランジスタのハイブリット化で消費電力低減に寄与
- **Electron mobility of KOS-B03C is higher than that of a-Si, and also is higher than that of IGZO.**
  Minimization of oxide transistor size can be realized.
- **Low temperature process is possible.**
  Oxide transistor can be formed during back-end process.
- **Wide band-gap semiconductor film is deposited by DC sputtering.**
  Transparent transistor can be formed directly on a transparent film.
- **Leakage current of oxide transistor is quite lower than that of the others.**
  Hybrid device with c-Si and oxide transistors leads to electric power saving.

表 1. 半導体薄膜特性
Table 1 Feature of various semiconductor films.

Thin-film semiconductor material	a-Si	LTPS (low temperature poly-Si)	Oxide
Electron mobility (cm^2/Vs)	0.5 -1	60 - 100	IGZO:10 KOS-B03C:20-30
Deposition method	CVD	CVD & Laser Anneal	DC Magnetron Sputtering
Large area	Possible	Impossible	Possible
Process temperature (°C)	< 350	< 600	< 350
Band gap (eV)	1.4 - 1.8	1.1	2.9 - 3.3
Off leakage current (A/mm)	1×10^{-13}	1×10^{-12}	1×10^{-16}

KOS-B03C を用いた薄膜トランジスタ特性
Characteristics of KOS-B03C thin-film-transistor

特 性　Characteristic

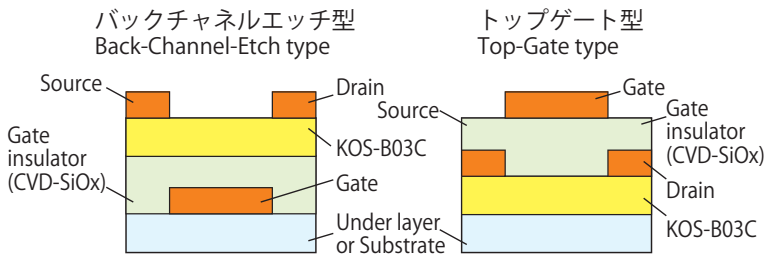
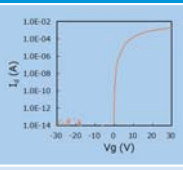
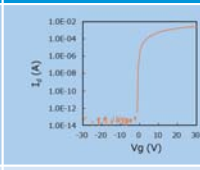


図 1. 薄膜トランジスタ構造
Fig. 1 Test structures of thin-film-transistor.

表 2. 薄膜トランジスタ特性
Table 2 Characteristics of thin-film-transistor.

	Back-Channel-Etch type	Top-Gate type
Transfer curve		
Saturation mobility	29.1 cm^2/Vs	24.4 cm^2/Vs
Vth	0.50 V	-0.75 V
S.S.	0.17 V/dec.	0.16 V/dec.

スパッタリングターゲット製品
Sputtering target products

製 品　Product

- **様々なサイズや形状のスパッタリングターゲット製品が供給可能**
- **Various size and shape sputtering target products can be supplied.**

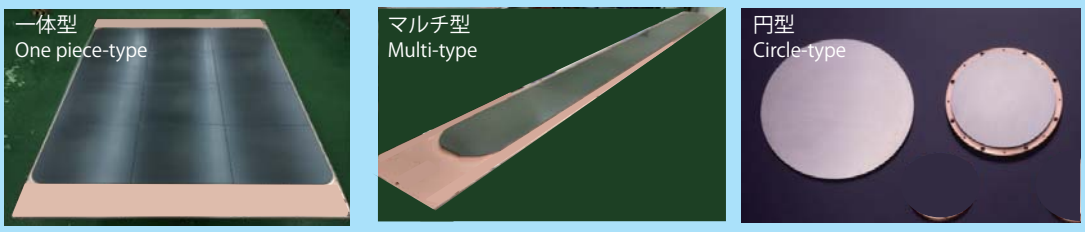


図 2. 酸化物半導体スパッタリングターゲット製品
Fig. 2 Oxide semiconductor sputtering target products.

BCE化可能な酸化物半導体材料

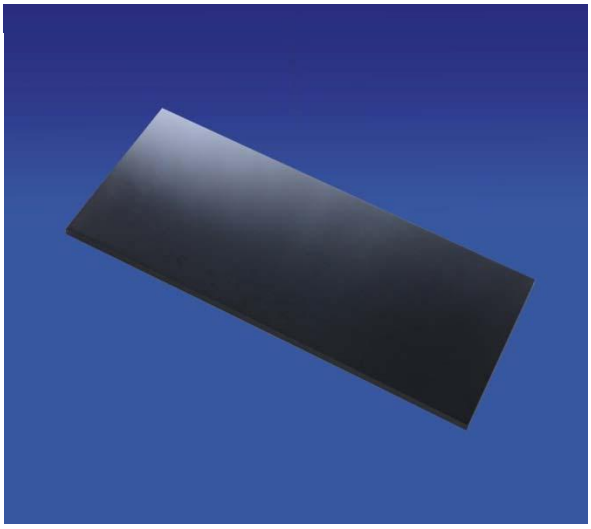
BCEプロセスへ適用可能な酸化物半導体TFT用ターゲット
Oxide Semiconductor Sputtering Targets which are applicable to BCE Process for Thin Film Transistor

■KOS-B02 Features

- **Resistant to PAN etchant**
  ⇨ **Applicable to BCE process**
- **Applicable to the same processes of forming IGZO**

■KOS-B02 sputtering target characteristics

Density	≧98%
Resistivity	1~3 x 10^{-2} Ω・cm
Purity	4N

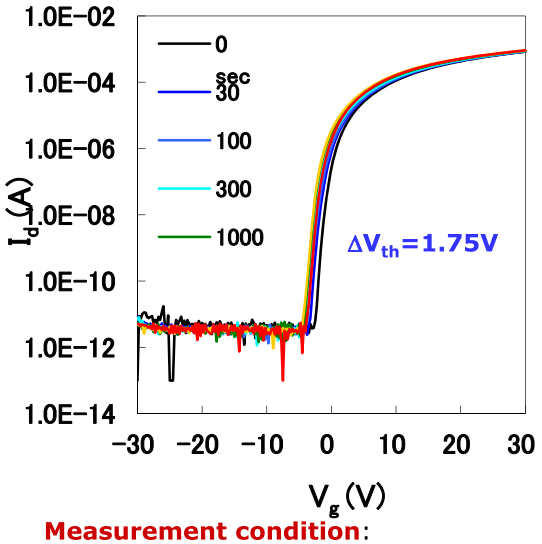


■KOS-B02 film characteristics（BCE-TYPE）

Mobility	5 ~ 15 cm^2/Vs

	Etching rate (nm/min.)
KOS-B02	0
IGZO	66

Etchant: PAN for Mo/Al/Mo
Mixed acid (H_3PO_4, HNO_3, CH_3COOH)



Measurement condition:
Vg= -20V, Vd= 10V, 60°C,
White LED (25000nit), 2hrs,
Exposure from the bottom side of TFT