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Nakano et al.

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(54)	SURFACE ACOUSTIC WAVE DEVICE
	HAVING A THIN METAL OXIDE FILM
	FULLY COVERING AT LEAST THE
	ELECTRODES AND METHOD OF
	FABRICATING SAME

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(56) References Cited

(IP)

U.S. PATENT DOCUMENTS

3,965,444 A 6/1976 Willingham et al. 333/155

4,017,890	A		4/1977	Howard et al 257/768
5,520,751	Α		5/1996	Pareek et al 148/286
5,766,379	Α	*	6/1998	Lanford et al 148/537
5,929,723	Α		7/1999	Kimura et al 333/193
6,090,435	Α	*	7/2000	Ueno et al 427/79
6,316,860	B1		11/2001	Kimura et al 310/313 A
6,365,555	B 1	*	4/2002	Moser et al 505/441

FOREIGN PATENT DOCUMENTS

JP	52-52585	4/1977
JP	B 2-47866	10/1990
JP	A 3-190311	8/1991
JP	A 04-150512	5/1992
JP	A 4-294625	10/1992
JP	U 07-39118	7/1995
JP	A 07-326942	12/1995
JP	A 08-032399	2/1996
JP	A 09-83288	3/1997
JP	9-503026	3/1997
JP	A 09-199974	7/1997

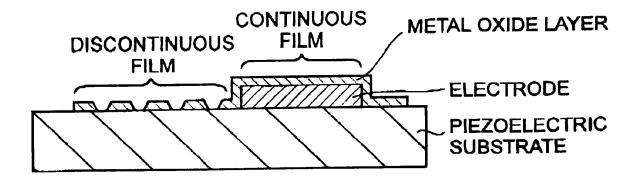
^{*} cited by examiner

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(57) ABSTRACT

A surface acoustic wave device includes a piezoelectric substrate having Al or Al alloy electrodes formed on a surface of the substrate, a metal oxide film provided on the substrate and the electrodes. The metal oxide film is formed by a process including depositing a metal thin film having a thickness sufficiently thin so that the deposited metal thin film is discontinuous including voids, and oxidizing the discontinuous metal thin film, and the metal oxide film includes a continuous portion without voids covering the electrodes.

25 Claims, 7 Drawing Sheets



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