
AXIC APPLICATION REPORT

Non-Destructive Thin Film Analysis
Composition/Thickness

3

The Axic 100

This dedicated x-ray fluorescence unit is designed for use in fabrication facilities by fab engineers. Uniquely employing both wavelength and energy dispersive detectors, it can non-destructively analyze many different types of single and multi-layer films.

Typical applications include precision composition and thickness measurement of semiconductor metal and dielectric films, magnetic media and other applications involving single layer and stacks of materials.

Many other coatings may be analyzed including optical applications and superconducting films. All elements from atomic number 11 can be analyzed.

Through the use of both EDS and WDS, the capabilities of x-ray fluorescence are substantially increased over EDS techniques alone. Data is simultaneously taken from both channels and solved for composition, reported in Wt. % of the element under analysis, and for thickness, reported in Å.

Films for analysis include:

**SINGLE ELEMENT
FILMS**

Al
Au
Cr
Ni
Fe
Ag
Ti
W
Cu
Co

**COMPOUND ELEMENT
FILMS**

PSG
BPSG
Silicides
Nitrides
NiCr
AlCu
AlSi
AlSiCu
AlTi
TiW
NiFe
CoCr
NiP
CoNiFe

**LAYERED
STACKS**

Cr/Au
Cr/Ni/Co
Ag/Ni/Ti
Au/Ti
Pd/Ti
Au/Ni
Au/Ni/Cu
Au/Ni/Ti

Typical Application/Measurements

<u>Film Type</u>	<u>Measurement</u>	<u>Results</u>
TiW	Thickness	185 Å ± 4
TiW	Thickness	1634 Å ± 11
Ag/Fe Stack	Thickness	2000 Å ± 20 (Ag) 200 Å ± 4 (Fe)
Al/Si/Cu	Composition/Thickness	.64 ± .04 Wt. % Si .45 ± .05 Wt. % Cu 10200 Å ± 100
Pt	Thickness	157 Å ± 3
Au	Thickness	12100 Å ± 100
Cr/Au Stack	Thickness	181 Å ± 15 Cr 1838 Å ± 20 Au
WSi _x	Composition	74.9 ± 0.6 Wt. % W
TaSi _x	Composition	76.1 ± 0.8 Wt. % Ta
Ni/Fe	Thickness/Composition	41000 Å ± 200 19.1 ± .1 Wt. % Ni
PSG	Thickness/Composition	4714 Å ± 80 4.06 ± 0.17 Wt. % P
PSG	Thickness/Composition	10400 Å ± 100 7.6 ± .1 Wt. % P
PSG	Thickness/Composition	3925 Å ± 40 3.9 ± .1 Wt. % P
SiC-TiB ₂	Thickness (over Sapphire)	30 Å ± 2
SiC-TiB ₂	Thickness (over Sapphire)	320 Å ± 8
Si ₃ N ₄	Thickness	1480 Å ± 15
Al	Thickness	470 Å ± 5
Co/Cr	Thickness/Composition	375 Å ± 5 17.5 ± .1 Wt. % Cr



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