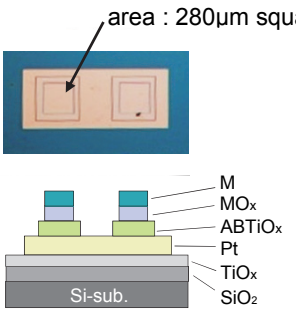
μ-RBS / HFS Composition and Density Analysis in Micro Region

New focusing method for MeV ion beam has been developed, and this leads to the application of RBS / HFS analysis in 100μm square (μ-RBS / HFS). This method will give you accurate composition and depth profile in specific area, which is useful for evaluation of thin films in devices, antireflection layer in solar cell, etc.

Multilayer Depth Profile in Thin Capacitor



*M, A, B : Metal

μ-RBS analysis is applied to electrode and ferroelectric layer in thin capacitor.

- Accurate composition after device fabrication
- Change in depth profile by various tests

can be evaluated.

Fig.1 : Optical Micrograph(OM) and structure of thin capacitor

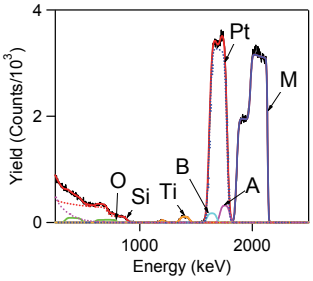


Fig.2 : μ-RBS spectrum

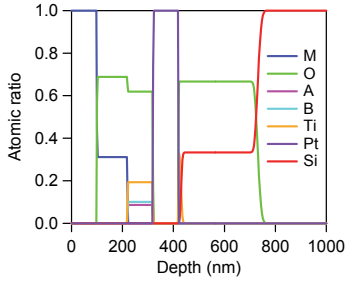


Fig.3 : Depth profile

Composition and Density in Specific Area

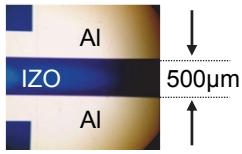


Fig. 4 : OM

μ-RBS/HFS analysis is done for transparent conductive film after Al electrode formation. Density in small area can be obtained using film thickness. In addition, film composition, including hydrogen, can be evaluated.

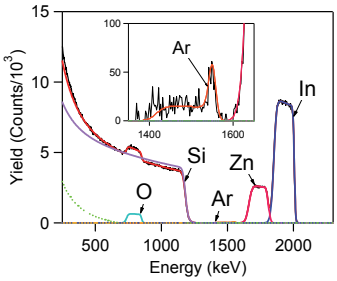


Fig.5 : μ-RBS spectrum

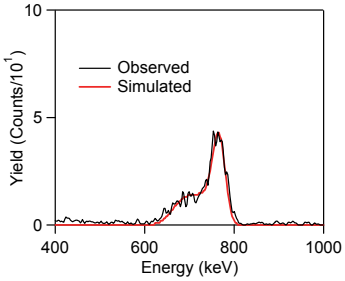


Fig.6 : μ-HFS spectrum

Table1 : Composition, thickness, and density of IZO thin film

	atomic%					thickness	density
	In	Zn	O	Ar	H	nm	g/cm^3
IZO	25.1	19.3	53.1	0.3	2.2	73.3	5.93

Antireflection Layer Evaluation in Solar Cell

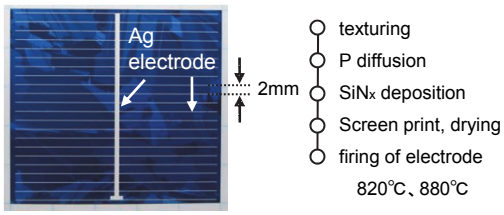


Fig.7 : OM and fabrication process of polycrystalline Si solar cell

- Compositional analysis is done for SiN_x film, with different firing temperature. However, in HFS analysis, using ion beam with slant incident condition, hydrogen quantification is difficult because of the effect of texture shapes.
- In this case, NRA(Nuclear Reaction Analysis) is applied for hydrogen quantification. The narrow resonance width of the reaction $^1H(^{15}N,\alpha\gamma)^{12}C$ can reduce the effect of texture shapes, and hydrogen depth profile, including SiN_x / Si interface, can be obtained.

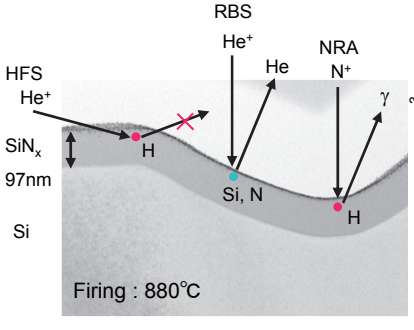


Fig.8 : Cross-sectional TEM image

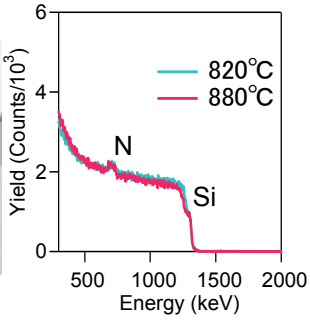


Fig.9 : μ-RBS spectrum

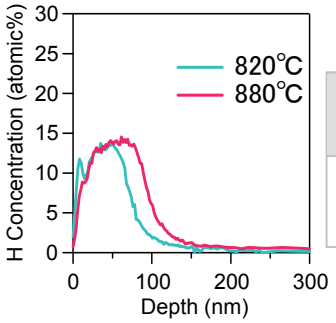


Fig.10 : H depth profile by NRA

Table 2 : Composition of SiN_x film

	atomic%		
	Si	N	H
820℃	38.7	48.1	13.2
880℃	45.7	40.7	13.6