

# Development of a new process technology for CIGS solar cells

## Toward mass production of CIGS solar cells by all-dry processes

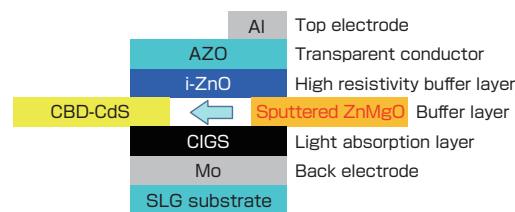
We have developed a new method to fabricate a buffer layer for CIGS solar cells. The new buffer layer is a ZnMgO alloy fabricated by the sputtering method. Advantages of the new method are that (i) ZnMgO is Cd-free and hence is effective to reduce the environmental load, and (ii) the sputtering method is a dry process which is simple compared to wet processes. The conversion efficiency of the CIGS solar cell using the new buffer layer is 17.5 %, which is comparable to that of CIGS solar cells using a conventional CdS buffer layer fabricated by wet processes. This result strongly suggests that we can fabricate high efficiency CIGS solar cells using all-dry deposition processes. We are going to improve our new technology to obtain higher conversion efficiency, and to apply it to large area substrates. These are indispensable for the industrialization.

### Hajime SHIBATA

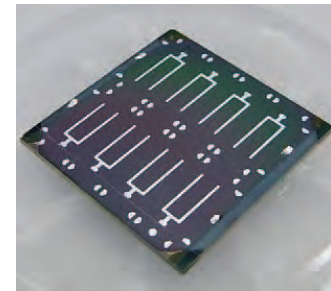
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Device structure of CIGS solar cells studied in this work



CIGS solar cell with buffer layer fabricated by sputtering method

# Reconstruction of the human evolutionary history using the whole genome sequences

## Denial of the interspecies "hybridization" event between humans and chimpanzees

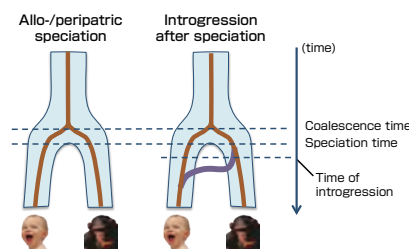
Interspecies hybridization after the speciation between humans and chimpanzees has been a heated controversy in evolutionary biology. Because the whole genome sequences for humans and three great apes are now available, we examined the evolutionary history of the human lineage using a rigid statistical model of genomic sequence evolution. We estimated the products of divergence time and mutation rate for each chromosome between humans and chimpanzees. The estimated values varied significantly among chromosomes, the X chromosome being the smallest value, but the variation could be explained by the variation of mutation rates among chromosomes, not by the variation of divergence times. This means that the speciation between humans and chimpanzees is a single event. In conclusion, we could successfully deny the interspecies hybridization event between humans and chimpanzees.

### Tadashi IMANISHI

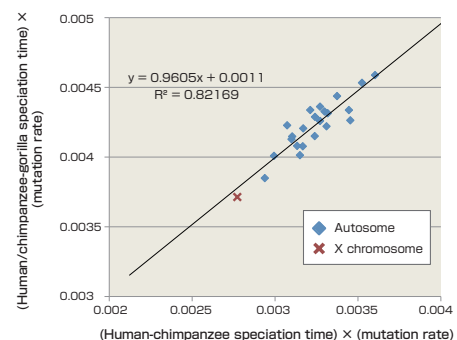
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Two contrasting models of speciation between humans and chimpanzees



Products of divergence times and mutation rates correlate among chromosomes