

Crystallization of silicon films with carbon nanotube electron beam (C-beam)

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Carbon nanotube (CNT) emitters are promising electron beam emitter for many device applications such as X-ray. Lighting lamp, cathodoluminescence and crystallization due to it has many attractive properties in field emission. In this study, we introduced a carbon nanotube electron beam (C-beam) for crystallization of silicon thin films.[1-2]

CNT emitters grown by resist-assisted patterning (RAP) process is used for the source of electron beam to crystallize an amorphous silicon thin film to nano-crystallized silicon in the triode system. As a source of electron beam, the CNT emitters are placed at cathode. Passing through the gate mesh with high accelerated energy, amorphous silicon thin film which was placed at the anode plate was impacted by high electron energy. The high electron energy is enough to change phase to nano-crystalline silicon due to the network vibration of silicon atoms. We confirm the high crystallinity of silicon thin films through the RAMAN spectroscopy. The grain size distribution of silicon thin films about 5~20 nm as a result of SEM measurement. We expect that this film will be a good replacement as a new active layer of thin film transistors (TFTs).

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References

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