

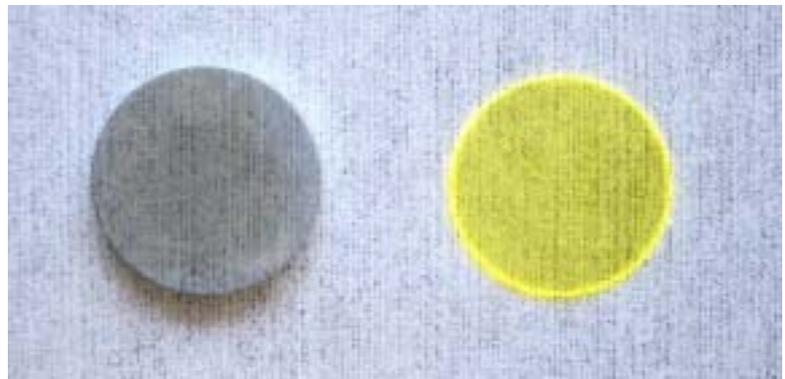
**Feasible study of YAG : Ce scintillator introducing to our products**

YAG:Ce (Yttrium aluminum garnet activated by cerium) scintillator has favorable characteristics for X-ray imaging. The main important properties of YAG:Ce are high density, fast decay time, chemical, mechanical and temperature resistance especially because of its hardness - [Mho]8.5 YAG:Ce can be thinned to **5 micrometers** thickness. Eventually YAG:Ce screen has the possibility to be 5micrometer spatial resolution scintillator. This time we made X-ray imaging screen using YAG:Ce scintillator glued to FOP. After coupling to FOP scintillator was polished and thinned down to 0.02t thickness.

**YAG:Ce X-ray screen sample**

Left : 0.02t thickness YAG:Ce  
on FOP substrate

Right : 0.5t YAG:Ce scintillator  
before polish



**Image quality comparison with CsI scintillator**

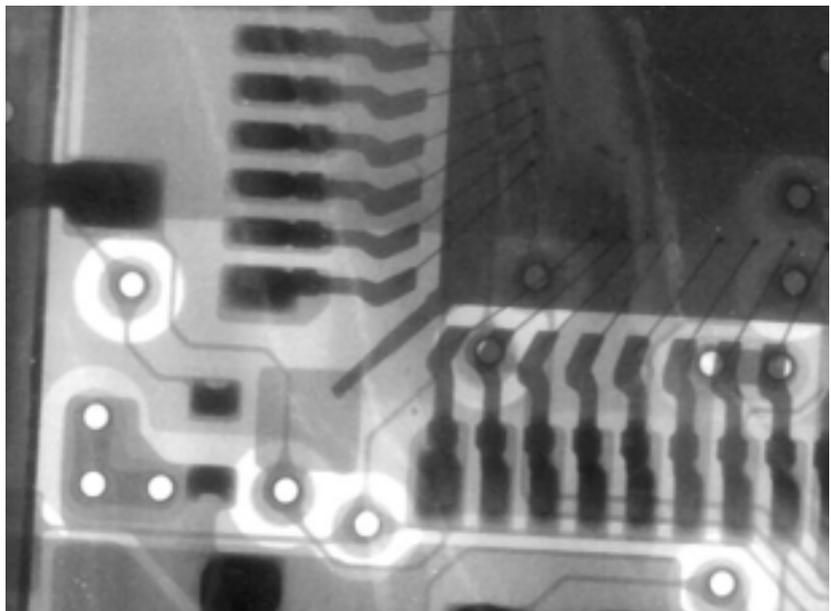
**Image using YAG:Ce**

**X-ray condition**

50KV, 0.5mA

**Exposure time**

3 sec



**Comment:**

Thinned scintillator's light output is very small therefore long exposure time is required.

Regarding resolution, same or better resolution could be achieved.

## Image using CsI:Ti

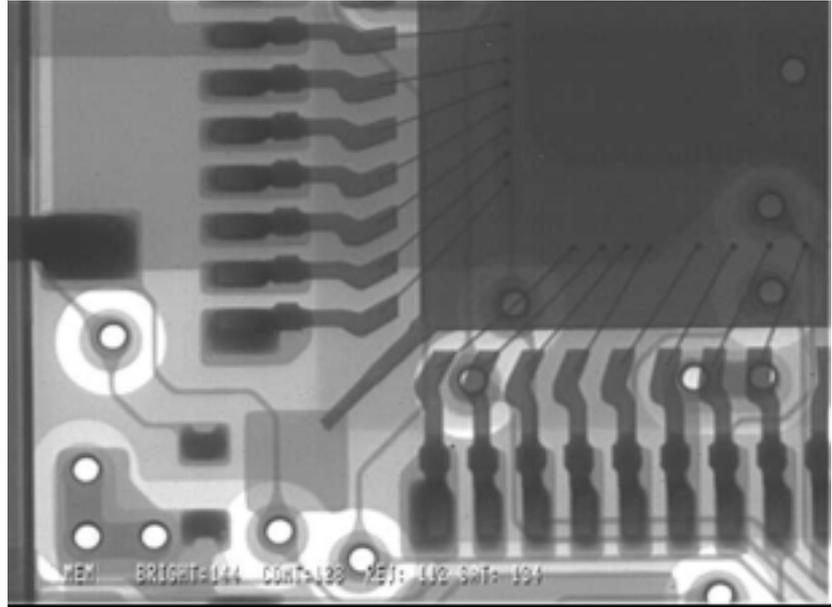
### **X-ray condition**

50kV, 0.5mA

### **Standard TV rate**

30 frame / sec

128 frame integration



### **Comment:**

YAG:Ce scintillator requires long time exposure comparing to CsI:Ti scintillator therefore introducing our standard model is difficult which employs analogue TV camera. In that meaning YAG:Ce scintillator is not suitable for industrial purpose X-ray imaging. But scientific application with high sensitivity camera such as cooled CCD camera could be appropriate because this configuration can be achieved higher magnification X-ray imager using micro focus X-ray tube. Original scintillator has 5 micrometer spatial resolution therefore 5 times magnification results in 1 micrometer resolution using distance control between sample and imager.

### **And Next**

Because of fast decay time, high frame rate TV camera of X-ray radiography could be possible but it needs high intensity X-ray source like synchrotron radiation. In another word it can be called High Speed X-ray Camera.

## **Characteristic of YAG:Ce scintillator**

- Material can be polished and thinned down to 0.005t thickness.
- The wavelength of YAG:Ce scintillation emission is ideal for CCD image sensor.  
Max. emission [nm]550
- Decay constant [ns]70 , afterglow [% at 6 ms] <0.005  
Fast decay time and afterglow is suitable for high frame rate TV camera.

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