

## **Recovery of indium from TFT and CF glasses of LCD wastes using NaOH-enhanced sub-critical water**

### **ABSTRACT**

Recently, we reported that 83% indium was recovered from CF glass and 10% from TFT glass of LCD panel wastes using sub-critical water at 360 °C. In the present work, in order to increase the recovery of indium in the form of indium tin oxide (ITO) and to reduce the reaction temperature, the effect of basic materials and their concentrations in sub-critical water on its recovery were tested. The basic materials were NaOH, KOH, Na<sub>2</sub>CO<sub>3</sub>, diethyl amine, Ca(OH)<sub>2</sub> and NH<sub>3</sub>. NaOH showed the largest recovery of indium from both CF and TFT glasses and reduced the reaction temperature. Treatment for only 5 min resulted in an outstanding indium recovery of 95% at 220 °C from TFT glass and 99% at 160 °C from CF glass. After the treatment, both TFT and CF glasses became transparent. ITO did not dissolve in the liquid-phase but remained in the solid organic multi-layers that were separated from the TFT and CF glasses by the sub-critical water reaction. These organic multi-layers were readily recovered by filtration. Since no indium dissolved in the liquid-phase, this recovery method is superior to others such as acid dissolution and ion-exchange. The optimum requirement of NaOH concentration and reaction time for indium recovery was 0.1 N and 5 min, respectively. The present result showed a significant improvement in indium recovery compared to our previous result without NaOH. Thus, sub-critical water in the presence of NaOH is highly feasible for the recovery of indium from TFT and CF glasses.

**Keyword:** LCD panel; Indium recovery; Sub-critical water in the presence of NaOH; TFT glass; CF glass