

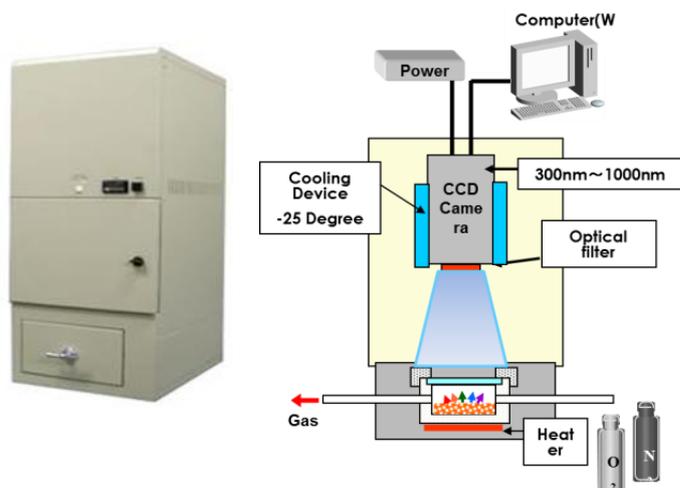
Chemiluminescence Imaging of oxidized polymer samples (PP, PC) using highly sensitive CCD camera

Introduction

The chemiluminescence technique provides a simple rapid procedure for detecting oxidation levels and the oxidative stabilities of polymers – without there being any need for chemical reagents or delicate skills. Application of CL imaging detection is summarised below.

CL Imaging System

Schematic Diagram of CL imaging system and its specifications are shown in Fig.1 and 2.



Detector	CCD Camera 300nm~1000nm
Measurement item	CL Image Picture CL Intensity (select area)
Sample chamber	CLS-ST3, CLS-MX3, CLS-MS, CLS-FL
Interface	Camera Link
Power Source	AC 100V, 50/60Hz, 5A
Size	310(W) x 446(D) x 775(H)mm · about 30kg

Fig.2 CL imaging system: Specifications

Fig.1 CL imaging system: Photo and Schematic Diagram

Measurement Examples

- Samples: oxidized PP with/without the additive Irganox1010 (BASF, 0.5%, 1.0%) used as a phenolic antioxidant. CL images were recorded with CCD type, CLA-IMG (Fig.3). Exposure time was 1min. Oxidation had commenced in the additive-free PP but, in contrast, the PP including additives was not oxidized.

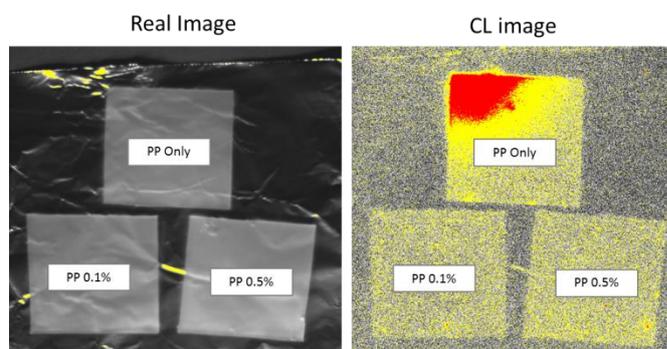


Fig.3 CL images of oxidized PP (upper: virgin; lower right: PP + Irganox 0.5%; lower left: PP + Irganox1%)

2. OIT measurement with CL imaging

Same PP samples used as Fig.1. PP was oxidized at 200C under oxygen flow. Time-course changes were measured at 200C under oxygen flow using PMT (Photomultiplier Tube) type, CLA-FS4 (Fig.4). CL images were taken with CCD type, CLA-IMG (Fig.5) under same conditions. Exposure time was 1min.

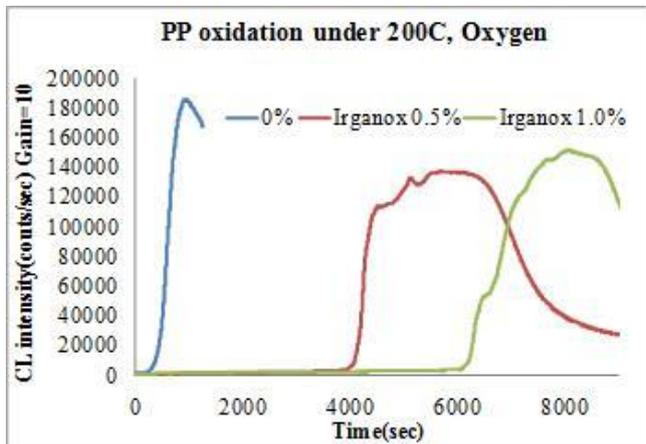


Fig.4 OIT of PP (Virgin, Irganox0.5%, 1%)

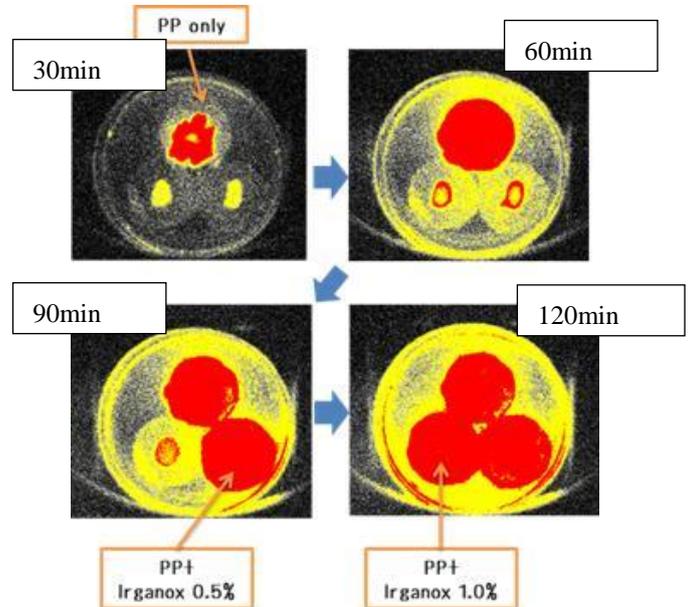


Fig.5 PP Oxidation: Time-course change of CL images

3. CL images of Polycarbonate (PC)

PC virgin and PP several times moulded (i.e. recycled samples) were used. Time-course changes were measured at 220C under oxygen flow using PMT. CL images were taken by CCD. Exposure time was 1min (Fig.6). The recycled PC exhibited much higher CL than virgin PC.

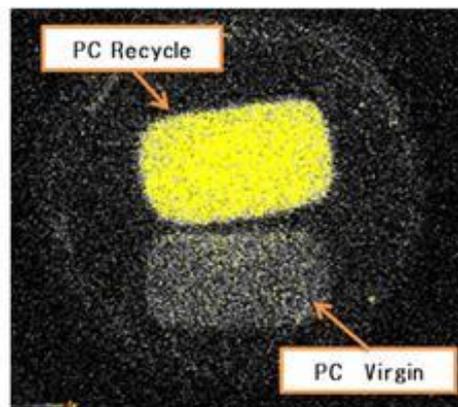
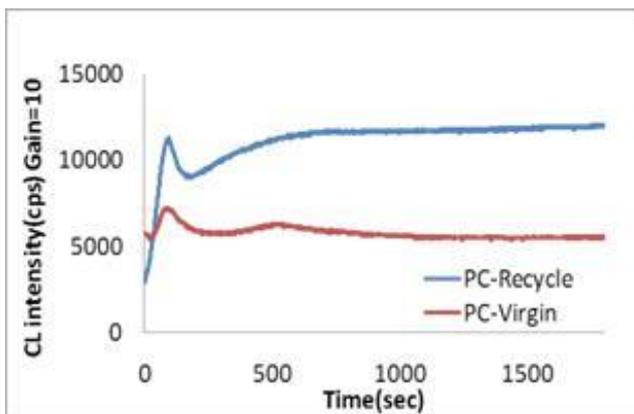


Fig.6 CL time-course change (left) and images (right).

Upper: recycled PC; Lower: virgin PC