Damage-free Deposition of Ultrathin Pressure Sensitive Adhesive with Viscoelasticity Control

정기훈, 문희연, 곽무진, 최시영, 임성갑†
KAIST
(sgim@kaist.ac.kr†)

A new fabrication method for ultrathin (500 nm-thick) pressure sensitive adhesive (PSA) was demonstrated by utilizing a series of *in-situ* cross-linked viscoelastic copolymer films. The PSA was composed of poly(2-hydroxyethyl acrylate-*co*-2-ethylhexyl acrylate) [p(HEA-*co*-EHA)], and synthesized by an initiated chemical vapor deposition (iCVD). In this process, initiation is triggered in the vapor phase either by heat or ultraviolet (UV). Especially, highly cross-linked copolymer can be obtained by photo-initiated chemical vapor deposition (PiCVD) method which is initiated by UV, whereas linear copolymer synthesized via thermal iCVD. By combining of both process, the cross-linking density can be controlled. The adhesion performance of the PSA was optimized by adjusting the composition of copolymer and the crosslinking density. As a result, a high shear strength of 85.2±5 N/cm^2 was achieved, and we confirmed optical transparency, thermal stability even at 200 ℃, and adhesion to various kinds of substrates. We expect that the ultrathin PSAs developed in this work will be utilized widely for soft electronic devices, which require strong adhesion, and tunable viscoelastic properties.