

A new technique to measure glass transition temperature and crystallinity of polymers in-situ using restitution after ball collision

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Glass transition temperature(T_g) and crystallinity(X_c) are important when determining processability and thermal stability of polymers as properties change significantly. However, current techniques to measure T_g and X_c need to prepare separate samples, are hard to measure polymers with complex structures and are almost impossible to make in-situ measurement. Here, we suggest a new novel technique to measure T_g and X_c of polymers by measuring restitution after ball collision. At T_g , polymers can dissipate transferred energy maximally as their chains can do segmental motion. So, if we drop the ball on the polymers while increasing temperature, restitution height is high in low temperature, decreases dramatically and reaches the lowest value. Considering high frequency measurement, we determine T_g as starting point of dramatic decrease region, X_c as minimum restitution value. Through this measuring technique, lots of advantages are expected in polymer academia and industry as it will be able to measure T_g and X_c of complex polymer materials in-situ.