

Photothermally responsive PNIPAM/gold nanoparticles for the release of anti-tumor drug molecules

권예진, 윤세미, 최종훈<sup>†</sup>

중앙대학교

(jonghoonc@gmail.com<sup>†</sup>)

Drug release at an appropriate rate is an important factor in drug delivery. The use of stimulus responsive polymers in drug delivery systems is a method of controlling drug release rate. Poly (N-isopropylacrylamide) (PNIPAM) is one of the extensively studied temperature-responsive polymers that changes hydrophobic or hydrophilic properties depending on lower critical solution temperature (LCST) (at 32°C). We synthesized the PNIPAM by adapting the reversible addition-fragmentation chain transfer (RAFT) polymerization method. The synthesized PNIPAM contains a thiol group providing moieties to rod-shaped gold nanoparticles (AuNPs). The polymer-nanoparticle complexes contain anti-tumor drug molecules (e.g. doxorubicin) through noncovalent conjugations. Irradiation on PNIPAM/AuNPs/Doxorubicin with near IR increased the temperature of solution over LCST. Simultaneously, PNIPAM aggregates as it became hydrophobic and released doxorubicin molecules. Reported work demonstrates the triggered drug release upon controlling the temperature of microenvironments by preparing the photothermally responsive polymer-nanoparticle complexes in response to light irradiation.