Photothermal Microheaters Composed of Metal Nanoparticle-Embedded Photonic Crystal

이준석, 이건호, 김신현*
KAIST
(kim.sh@kaist.ac.kr*)

Photonic crystals have periodic modulation of refractive index and provide unique photonic properties of photonic band gaps and band edges. Photons with energy of band gap are inhibited in photonic crystals, whereas photons with energy of band edges can slowly propagate and strongly interact with the materials. In this study, we use the band edge effect to maximize photothermal effect of gold nanorods, which can absorb the near infrared (NIR) light. To accomplish this, we prepare inverse opals, which have a face-centered cubic lattice of spherical air cavities, as photonic crystals by colloidal templating. Gold nanorods are incorporated on the surface of air cavities. When the inverse opals are designed to have band edge position at the plasmonic wavelength of the gold nanorods, temperature of the surrounding rapidly increases upon irradiation of NIR laser. By the inverse opal of which band gap is located at the plasmonic wavelength exhibits slow increase of temperature due to strong reflection of incident laser.