Type I collagen-stabilized gold nanoparticles produced by pulsed laser ablation in liquids and γ-ray irradiation

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Peptides and/or gelatin have attracted considerable attention as unique matrices to stabilize metal nanoparticles (NPs). These metal NPs excel in their colloidal stability and enhanced biocompatibility[1]. In this study, we focused on type I collagen (Col^{T1}) as a unique stabilizing matrix, since it has distinctive chemical structure; triple helix structure and exceptional physical property as thermal sensitivity[2,3].

AuNPs stabilized by Col^{T1} (Au:Col^{T1}) with the particle size of 2.2±1.3 nm were successfully prepared in 1xPBS by ablating target bulk Au (pulsed laser ablation in liquids-PLAL) within 1 h using a microchip laser (1064 nm, Nd:YAG, 160 mW) (Figure 1A).[4] The triple-helix structure of Col^{T1} was maintained after laser irradiation by circular dichroism spectroscopy. Likewise, $HAuCl_4x3H_2O$ was added to Col^{T1} in 1xPBS to form metal cross-linked gel, which was later irradiated by γ-ray (20 kGy) and produced uniformly distributed AuNPs with the particle size of 4.3±1.3 nm (Figure 1B). In addition, the thus-obtained gel from $HAuCl_4$, showed improved viscoelasticity compared with the pristine metal cross-linked collagen gels. SEM images of the irradiated sample showed that the morphology of collagen changed after γ-ray irradiation.

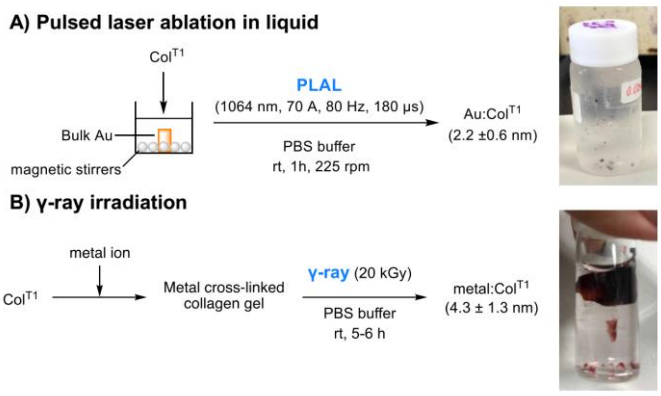

Figure 1 Preparation of Au:ColT1 by **(A)** PLAL and **(B)** γ-ray irradiation.

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