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WITHDRAWN - Theoretical and experimental investigation on the formation of plasmonic nanostructure on a tapered optical fiber

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Optical tweezing is a well-known phenomenon for trapping or manipulating dielectric and metallic nanoparticles. The application of metallic nanoparticles in sensing has attracted a lot of attention due to their unique optical and chemical properties. We have developed a unique plasmonic structure on the surface of a multimode tapered optical fiber by optical tweezing of gold nanorods. In order to explain the formation of the nanostructure on the surface of the tapered fiber we will present both the results of our theoretical and experimental investigation. The theoretical results will include the variation of the scattering and gradient forces for trapping gold nanorods as the diameter of the tapered fiber section changes. It was found that as the tip diameter of the fiber decreases, the gradient force increases more rapidly than the scattering force. The theoretical results will lead to an estimate of the tip diameter of the tapered fiber to trap a single gold nanorod.

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