

Enhancement of Raman Scattering using Photonic Nanojet and Whispering Gallery Mode of a Dielectric Microstructure

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Abstract : We report the enhancement of Raman scattering signal by one order of magnitude using photonic nanojet (PNJ) of a lollipop shaped dielectric microstructure (LSDM) fabricated by a pulsed CO₂ laser. Here, the PNJ is generated by illuminating sphere portion of the LSDM with non-resonant laser. Unlike the surface enhanced Raman scattering (SERS) technique, this technique is simple, and the obtained results are highly reproducible. In addition, an efficient technique is proposed to enhance the SERS signal with the help of high quality factor optical resonance (whispering gallery mode) of a LSDM. From the theoretical simulations, it has been found that at least an order of magnitude enhancement in the SERS signal could be achieved easily using the proposed technique. We strongly believe that this report will enable the research community for improving the Raman scattering signals.

Keywords : localized surface plasmons, photonic nanojet, SERS, whispering gallery mode

Conference Title : ICAN 2018 : International Conference on Applied Nanophotonics

Conference Location : Mumbai, India

Conference Dates : February 22-23, 2018