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High Yield Microsphere Formation Using an Excimer Laser¹

RYAN LU, TERESA EMERY, AYAX RAMIREZ, SPAWAR Systems Center, Pacific — The need for low-cost photonic devices has stimulated a significant amount of research in silicon photonics. Although silicon photonics is less well-developed as compared to III–V technologies, it has the potential to make a huge impact on the optical communications industry. Silicon is transparent in the standard ITU optical communication bands, which makes silicon the material of choice for passive and active optoelectronic devices. Recently, microspheres are gaining an important place in the optical microcavity resonator community due to their high quality factor morphology-dependent resonances (MDRs). Silicon microspheres with high quality factor morphology dependent resonances are used for resonant detection and filtering of light in the near infrared. The experimentally measured quality factors are limited by the sensitivity of the experimental setup, however, the microsphere quality factor is several magnitudes of order higher than current microring resonators. These optical resonances provide the necessary narrow linewidths, that are needed for high resolution micro-photonic applications. A reproducible process to quickly fabricate uniform microsphere particles with a narrow distribution of diameters and high yield is presented in this paper.

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