## Verification of Lasing through Lineshape Anomaly in High- $\beta$ Nanolasers

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We investigate an InP-based silver-coated nanolaser at 10 K, emitting at telecom wavelengths. Powerdependent  $\mu$ PL studies show a smooth s-shaped I/O and an 8-fold linewidth narrowing, indicating high- $\beta$ lasing operation, which is validated in quantum optical photon-autocorrelation studies [1,2]. Interestingly, a pump-power dependent lineshape transition from a Lorentzian to a dominant Gaussian profile is observed in the emission spectrum, above the threshold pump power. This intriguing effect arises from cavity eigenmodes that extend into free space and interact through medium nonlinearities [3]. The lineshape transition is directly related to the lasing transition and the related change in the lineshape factor, defined as ratio of the Lorentzian and the Gaussian contribution, poses an accessible way of verifying lasing in high- $\beta$  nanolasers [1].

## References

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