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and beam divergence as low as 2° x 2° was measured. The significant enhancement of the emission properties is attributed to an improved extraction efficiency from PAMs. The high-quality beam profile originates from constructive interferences authorized by the phase-locking, providing a powerful means to shape the beam, similar to what has been widely used in the case of RF antennas [8].

In conclusion, we report the use of arrays of PAMs as a powerful strategy to improve the emission of THz QCLs in DM configuration. Arrays of PAMs allow a precise tuning of the losses, leading to high extraction efficiencies and shaping of the beam. We believe that our design can become an important platform to exploit the benefits of microcavities to achieve efficient and compact THz sources as well as to study novel regimes such as THz optical nonlinearities and amplification, which would be beneficial for many imaging and spectroscopy applications.

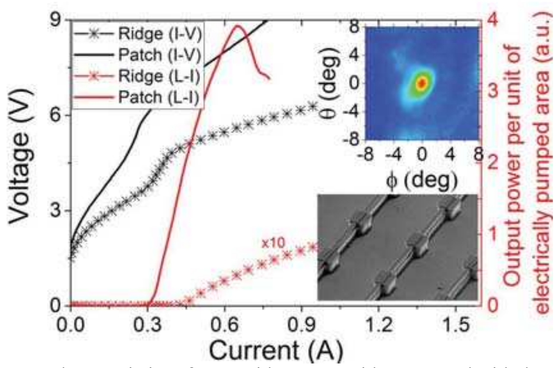

Fig. 1. L-I-V characteristics of a DM ridge waveguide compared with the PAM array. Inset: (Up) measured far-field pattern of the PAM array. A beam divergence with FWHM = 2° x 2° was measured. (Down) SEM picture showing a close-up view of a fabricated array device.

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