Selected achievements of microcavity plasmas in fundamental science and technology: Molecular physics, cooled plasmas, high power VUV lamps, and transistors

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Microcavity and microchannel plasmas are nonequilibrium, low temperature glows confined in at least one spatial dimension to the mesoscopic scale (nominally less than 500 um). This lecture will briefly review the applications of these unique plasmas to fundamental science, photonics, and plasma chemistry, including: 1) cooling short-lived, electronically-excited molecules to well under 100K in a supersonic expansion; 2) laser spectroscopy of a previously unobserved molecular complex, and 3) the realization of thin VUV lamps having unprecedented average and peak powers- more than 20 W and 1 kW, respectively, from a 10 cm x 10 cm surface. The commercialization of ozone generating systems, based on "massively parallel" processing in microchannel plasma arrays, will also be described, and the presentation will conclude with comments concerning future scientific opportunities, and the enormous potential of hybrid plasma/optical systems for plasmachemical processing, plasma photonics, and plasma electromagnetics.