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Suppression of chemical turbulence in the catalytic oxidation of CO by laser light

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We study the influence of an artificially initiated target pattern on turbulent spatiotemporal dynamics in the catalytic CO oxidation on Pt(110). Focussed laser light is used to create a temperature heterogeneity on the catalytic surface. This locally increases the oscillation frequency of the system and leads to the development of a pacemaker. The pacemaker emits concentric waves which slowly entrain a large fraction of the surface and suppress the chaotic dynamics. Depending on parameters like CO partial pressure and laser power we observe different dynamical regimes with full, partial or absent control of turbulence. A variation of the laser power allows for a scan of the dispersion relation of propagating wave trains. Phase slips occur, when the wavelength of the target pattern falls below a critical value. The experimental results are accompanied by numerical simulations using the Krischer-Eiswirth-Ertl model for CO oxidation.