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Title:Wideband ultralow high-order-dispersion photonic crystal slow-light waveguide

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Abstract:We propose a two-dimensional photonic crystal line-defect waveguide, in which the two rows of air holes at the two sides of the line defect are infiltrated with dielectric materials. This waveguide exhibits an ultralow high-order-dispersion photonic band. Finite-difference time-domain simulation shows that ultralow high-order dispersion makes an ultrashort Gaussian pulse with width of 0.711 ps or even shorter, to 0.267 ps, propagate without observable pulse broadening and amplitude decrease in a $96\mu\text{m}$ long waveguide. The slow light with group velocity of $0.0239c$ in a very wide bandwidth of 1.876 THz can theoretically propagate as far as $711\mu\text{m}$ with tolerable spread. © 2011 Optical Society of America.