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**Optically Controllable Photonic Structures** ALEXANDER WALDROP, CHRIS O'BRIEN, OLGA KOCHAROVSKAYA, Department of Physics and Astronomy, Texas A&M University — Coherent control of the refractive index with vanishing absorption in multilevel systems was a subject of intense recent theoretical and experimental studies [1-3]. We suggest an attractive possibility to use such coherent control of refractive index for optical production and control of photonic structures in the resonant homogeneously distributed in space atoms. The idea is based on spatial modulation of a populated intermediate level position in three-level atoms in nearly degenerate ladder configuration leading to periodic resonant increase and decrease of the refractive index simultaneously keeping zero absorption/gain. Modulation of an intermediate level position is provided by an external standing wave of a laser field via ac-Stark effect allowing one for both optical production and efficient optical control of the produced photonic structures. Possible implementation of the proposed method in rare-earth doped crystals with excited state absorption is considered.

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- [2] C.O'Brien and O.Kocharovskaya, Phys. Rev. Lett., 107, 137401 (2011).
- [3] C.O.Brien, et al., Phys. Rev. A 84, 063835 (2011).

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