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Bendett et al.

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(54) **RARE-EARTH DOPED PHOSPHATE-GLASS LASERS AND ASSOCIATED METHODS**

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(Continued)

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(57) **ABSTRACT**

(51) **Int. Cl.**⁷ **H01S 3/08**
(52) **U.S. Cl.** **372/102; 372/19; 372/22; 372/18**
(58) **Field of Search** **372/102, 18, 19**

Apparatus and method for integrating lasers and optics on glass substrates. An optical (e.g., laser) component formed from a glass substrate doped with a optically active lanthanides species with a plurality of waveguides defined by channels within the substrate. The laser component optionally includes a monolithic array of individual waveguides in which the waveguides form laser resonator cavities with differing resonance characteristics. Another aspect is directed toward pumping the laser wherein a superstrate waveguide cavity, or cladding, is positioned adjacent the substrate waveguide for supplying the latter with pump light. A closed crucible processing of optical waveguides on a glass substrate is also described. Waveguides are created by exposing a surface of the substrate to an ion-exchange solvent (e.g., a molten salt). A tightly sealed multi-part crucible is provided in order that gas does not leak in or out of the crucible during cooling or heating of the system.

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45 Claims, 15 Drawing Sheets

