

# Laser controlled ion exchange process and its applications

X. Li, S. Garner

*Science & Technology, Corning Incorporated, Corning, NY 14831, USA*

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## **Abstract**

We report on progress made in laser controlled ion exchange processes. In this study, a scanning CO<sub>2</sub> laser beam was used to heat a glass substrate and locally control an ion exchange process. The heat from the glass melted the required KNO<sub>3</sub> ion source, and the exchange occurred only where the laser was locally incident on the substrate. This process does not require global heating of the glass substrate, and the ion exchange process can be varied across the object. A depth of layer of about 18 μm was obtained after several minutes of laser processing. The ion exchange depth and relative ion concentrations were evaluated by SIMS analysis. This laser controlled ion exchange process could potentially be applied in processes for writing ion exchanged optical waveguides as well as locally strengthening glass substrates. Specific examples will be described for increased the strength of glass substrates near mechanically drilled holes by using laser controlled ion exchange processes. Potential applications of the technique to other areas of interest are discussed.