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**Cr<sup>3+</sup> optical probes of structural transformation in porous alumina** M.L. LOMBARDI, J.K. KREBS, Franklin and Marshall College — High surface area aluminum oxide is useful as a catalytic support for gas conversion devices. Upon heat treatment at temperatures in the range of 700 to 1200°C, the high surface area structures undergo a series of transformations terminating in a dense ceramic composed of particles with the corundum structure. These structural transformations occur as the porosity of the material decreases, thus reducing the catalytic surface area. Among the various porous aluminum oxide structures, theta alumina is the highest temperature form that maintains porosity. Lanthanum impurities have been shown to increase the conversion temperature for the theta to corundum transition by preventing boundary creep. We report on an optical technique to observe the structural transition by monitoring the spectrum of trivalent chromium impurities. Since the energies of the d electrons of the chromium impurities shift with the local environment of the ion, optical spectra of the impurities provide sensitive probes for the local structure of the host alumina. We monitor the local structure as a function of heat treatment for various lanthanide concentrations. The temperature of the theta to corundum transition is unaffected by lanthanum addition at concentrations below 0.2 molar percent and increases significantly at higher concentrations.

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