Abstract
The comparative study presented in this work concerning the thermal evolution of sulfuric, oxalic and phosphoric porous anodic aluminas, points out some differences among their physico-chemical and structural properties which were not previously reported. Empirical formulas calculated from the thermal analysis of all the anodic aluminas under study indicate that sulfuric aluminas have a significant higher content of dopant anionic species, oxygen excess, and hydroxyl groups than the oxalic and phosphoric aluminas, indicating that porous sulfuric anodic aluminas should have a higher structural disorder and hydrophilic character than its counterparts. For all samples, transition alumina phases are formed around 900±C and ®-alumina above 1200±C, but in these transformations sulfuric and oxalic aluminas follow a different evolution from phosphoric alumina. In the former case, the formation of transition aluminas occurs with the almost simultaneous thermal decomposition of sulfates and oxalates and finally a pure ®-Al2O3 phase is formed; while for the phosphoric alumina, the phosphate does not decompose even at 1400±C, when a ®-Al2O3 phase unpurified with AlPO4 is observed. Infrared spectroscopy studies show that the coordination modes of the sulfuric and oxalic dopant species start to change well before their thermal decomposition, while, in the case of the phosphoric alumina, aluminum phosphate starts to form at the same time as the transition alumina phases.

Keywords
Anodic porous alumina; nanostructures; thermal analysis.