Fabrication of high-quality epitaxial thin-films of functional oxides by a chemical solution method.

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In this talk I will review our most important results about the physical properties of high-quality epitaxial oxide thin-films prepared by a chemical solution method.
In the first part of the talk I will describe our efforts for identifying the most relevant chemical aspects of the synthesis, and the strategies we followed for optimizing them.
After that, I will discuss several examples to demonstrate that an excellent control over the thickness, chemical, structural, electronic and magnetic homogeneity can be achieved on multicationic oxides, over areas of several cm^2 by this simple method.
I will show that epitaxial oxide-heterostructures can be also prepared in this way, which constitutes an important step forward in the competitiveness of the chemical solution methods, compared with traditional physical deposition techniques.
Finally, I will describe our attempts to combine this chemical solution technique with physical deposition methods (in this case MBE) for the synthesis of complex heterostructures on Silicon. Particularly, I will show how a large piezoelectric response can be obtained in relatively thick layers of $BaTiO_3$, deposited over porous chemically-synthesized layers of LSMO, on STO/Si.

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