# FROM WET SPONGES TO OPTOCERAMICS

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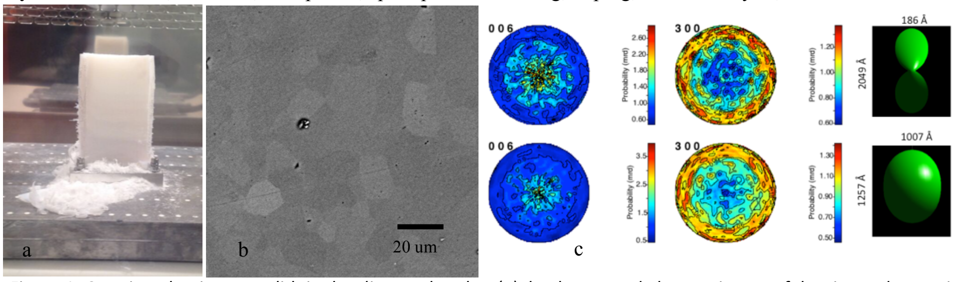


*Figure 1. Growing alumina monolith in the climate chamber (a), backscattered electron image of the sintered ceramic (b) and pole figures with crystallite shapes from the XRD texture analysis (c).*

Polycrystalline alumina ceramics are abundantly used in industry due to their chemical inertness, good insulating qualities and fascinating mechanical, thermal, and optical properties. Spinel ceramics have lately been in the limelight because of their promising nanoscale self-healing properties[1], which make them perfect for the pursuit of highly tolerant materials in the nuclear fusion power plants. The self-healing is only efficient for grain sizes below 100 nm. Thus starting powder with uniformly small crystallite/particle size is of utmost importance. There are a lot of different commercial alumina powders available but they tend to have wide particle size distributions. This leads us to revitalize the technique of aluminum oxidation through liquid mercury-silver layer[2] developed in our workgroup some years ago. This room-temperature synthesis (see Fig. 1a) leads to uniform ultraporous monoliths of hydrated alumina fibers, which can be easily doped by vapor or liquid. In this communication we will present the preliminary results of using alumina monoliths to produce alumina (see Fig. 1b), spinel and mullite ceramics with different grain sizes and optical properties. Comparison will be made using commercially available alumina powders. Texture study of a high-pressure sintered alumina ceramic will be presented (see Fig. 1c). Spark plasma sintering with two previously established[3] heating cycles was used to consolidate the materials. Optoelectronical properties of received materials were studied via cathodoluminescence.

## *References*

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