This presentation will summarize some current research performed at LCTS on CMCs imaging and image-based modeling. Several aspects of SiC fiber-reinforced non-oxide CMCs production and use are envisaged. First, processing by chemical vapor infiltration is addressed through a series of modeling tools allowing the prediction of infiltration gradients as a function of the processing parameters and of the fibrous architecture. Second, the self-healing capability of multiphase, boron- and silicon-containing matrices is modeled through the use of a specific image-based method. Third, the high-temperature mechanical behavior of these materials is investigated by a thorough analysis of time series of X-ray µ-CT scans, followed by a virtual material reconstruction and a posterior FEM analysis.

Figure 1 – Fiber-scale models developed from image analysis