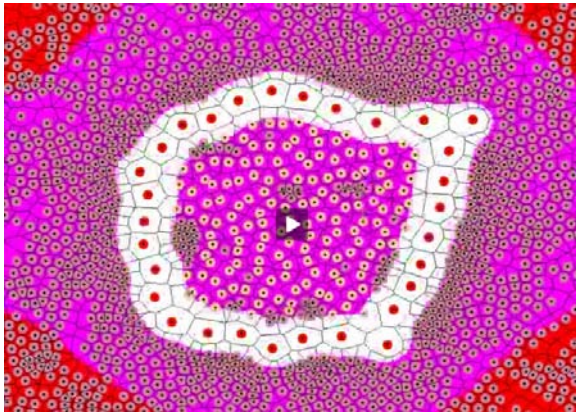# Drug Delivery at Georgia Tech and Emory

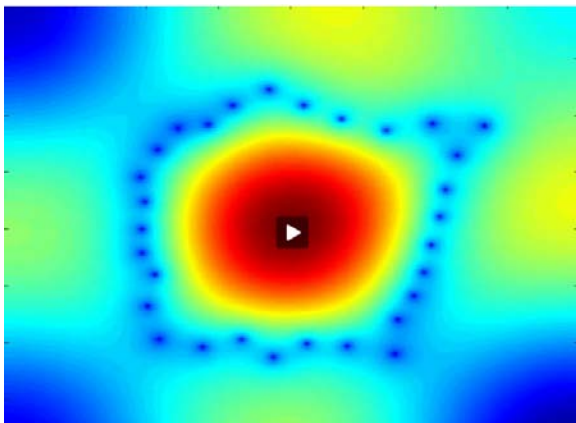**Simulation of Cancer Cell Response to Drug Delivery**

In this work, MATLAB is used to simulate the delivery of novel nanoparticle chemotherapy drug to cancerous tissue. Simulation allows scientists to predict experimental outcomes and thus reduce the cost of development and time to clinical relevance. The movies below show the initial proliferation of a cluster of tumor cells before death once the drug is administered. The simulation model includes blood vessels, tumor cells, and healthy cells and an engine to calculate the spatial distributions of both drug and oxygen. Jacket is used to speed up the diffusion calculations for the drug and oxygen within the tissue.

Authors: MIBLAB at the Georgia Institute of Technology. Center for Cancer Nanotechnology Excellence at Georgia Tech and Emory
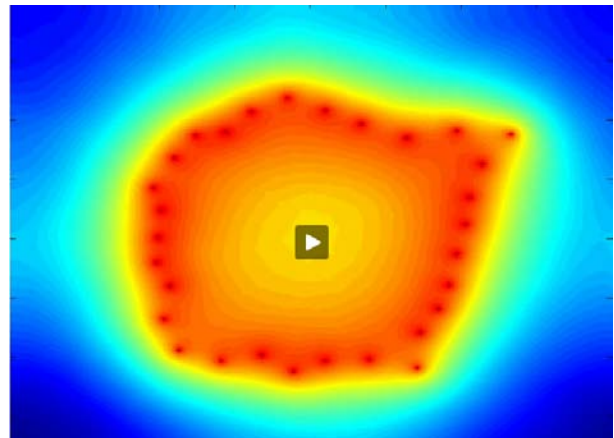**Speedup: 70X with Jacket**
System Specs: MATLAB R2008A, an NVIDIA Tesla C870 GPU, and an Intel E2180 CPU

Diffusion Profile of Drug Delivery

Tissue Oxygenation Profile

Jacket is a GPU engine for MATLAB®. Jacket enables standard MATLAB code to run on the GPU, connecting the user-friendliness of MATLAB directly to the speed and visual computing capability of the GPU.

Jacket is not another GPU API, nor is it simply a collection of GPU MEX functions. Rather, it is a complete and transparent system, automatically making memory transfer and execution optimization decisions. Jacket uses a compile on-the-fly system to allow GPU functions to run in MATLAB's interpretive style. Currently, Jacket is built on NVIDIA's CUDA technology.