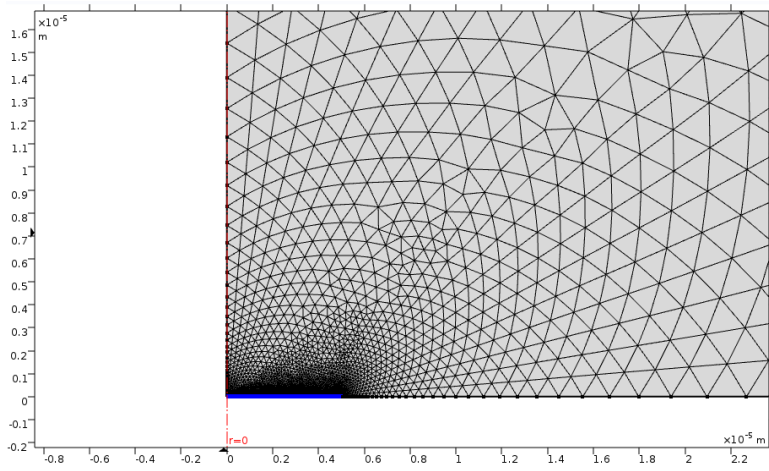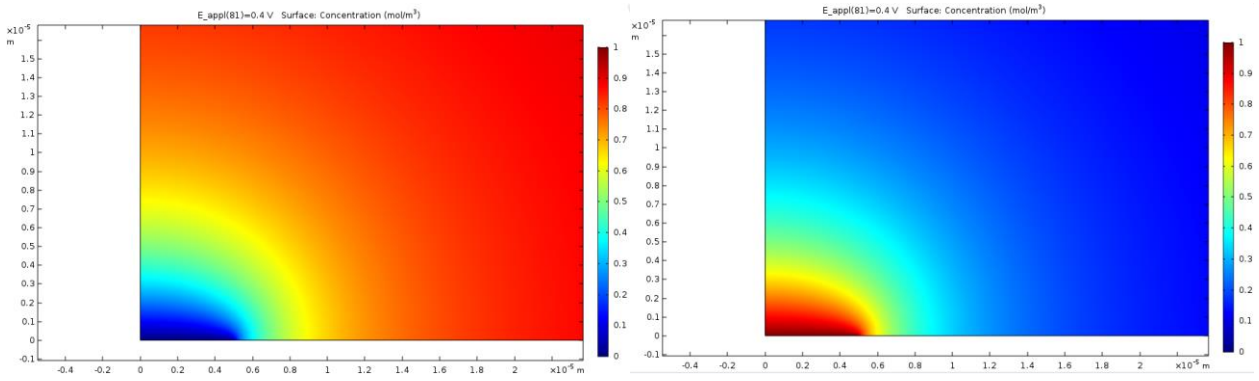## Expected behavior of microdisk electrode using 2-D axisymmetric model:
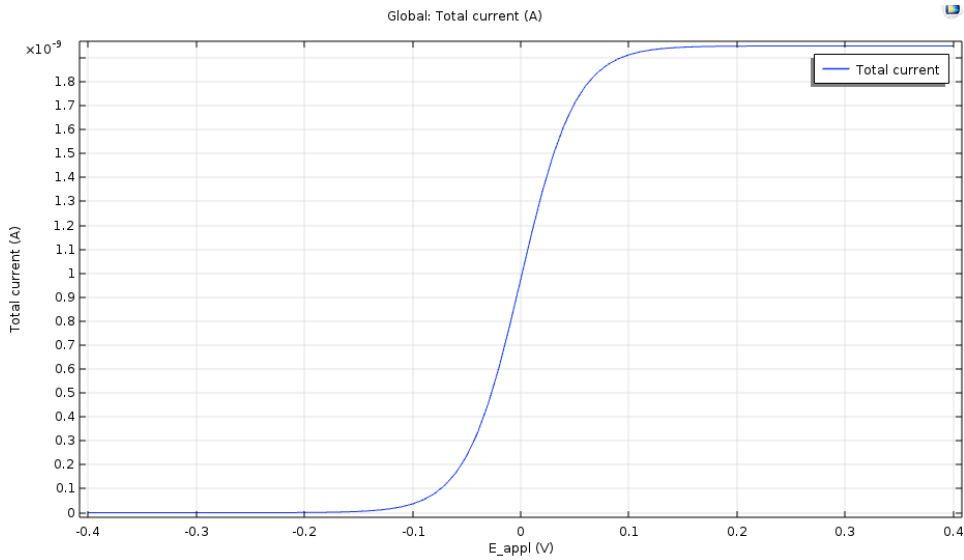
2-D axisymmetric model mesh:

Concentrations (left: reduced species, right: oxidized species) with an applied potential of +0.4 V vs. the reaction formal potential:
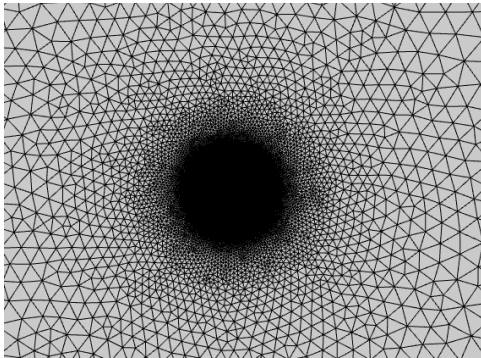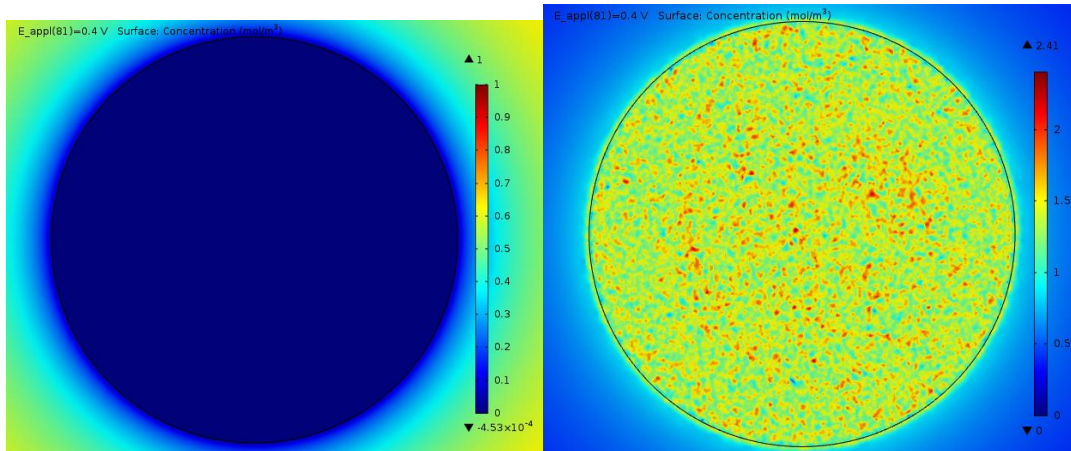

Current–potential curve:

## Anomalous Results with 3-D Model:

Example of mesh (in this case, I modelled the disk as one end of a cylinder nested in another cylinder):

Reduced species(left) and oxidized species(right) concentrations at the electrode surface with the applied potential at +0.4 V vs. the reaction formal potential. Negative concentration minimum for the reduce species and "hot spots" for the oxidized species violate the flux balance in the model.
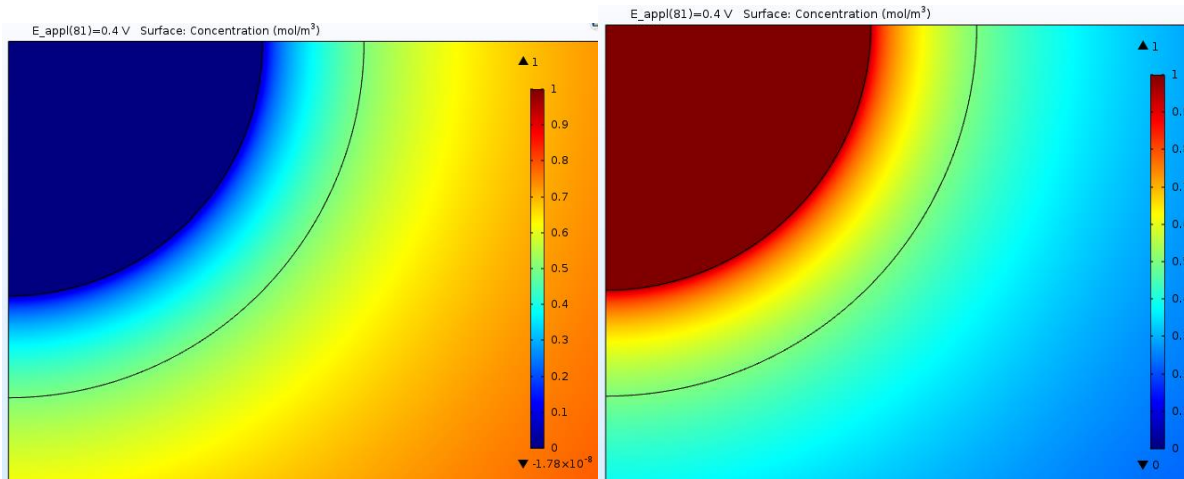

Current–potential curve showing unrealistic currents at positive potentials:
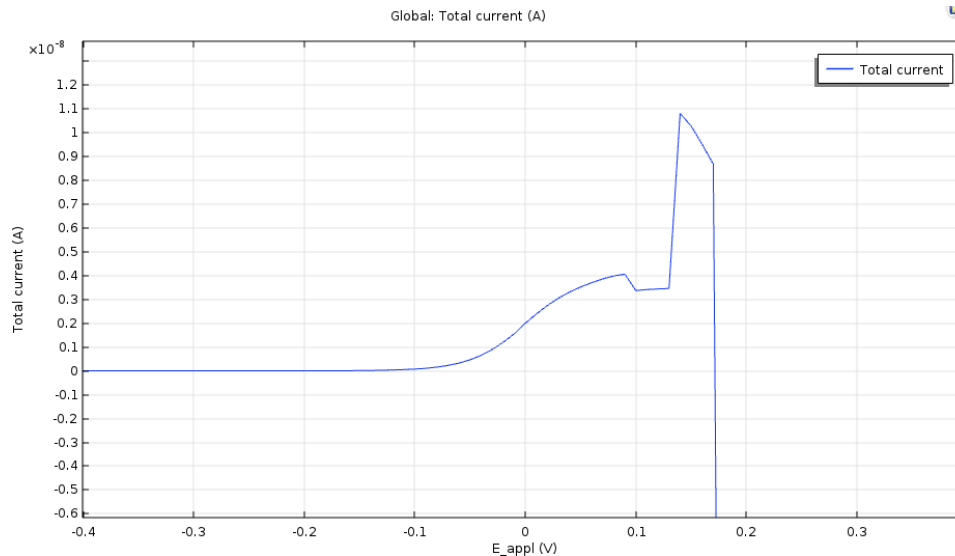
A second attempt using a boundary layer mesh: (this time I modeled only one quarter of the microdisk): (left image looks down on the electrode disk, right shows a closeup of the dense boundary layers stacked normal to the electrode face)
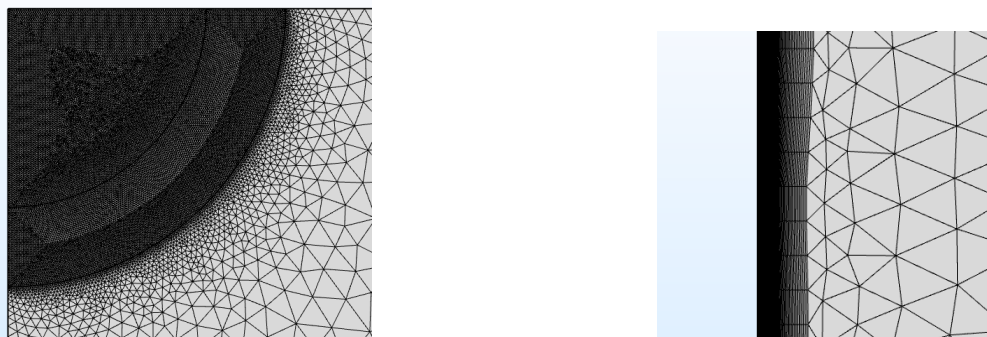
Reduced (left) and oxidized (right) species surface concentrations at E = +0.4 V. "Hot spots" appear to be gone…

… but the current–potential curve still shows an unrealistic shape: