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*Klebsiella pneumoniae* is one of the most common causes of intravascular catheter infections, potentially leading to life-threatening bacteremia. These bloodstream infections dramatically increase the mortality of illnesses and often serve as an engine for sepsis. Our current model for the dynamics of the size-structured population of aggregates in a hydrodynamic system is based on the Smoluchowski coagulation equations.

In this talk, I will discuss the progress of several investigation into properties of our model equations. In particular, I will focus on a) accurate characterization of the fractal properties for the aggregates, b) a differential geometry approach to fragmentation modeling, and (time permitting) c) self-similar solutions to the equations. (Received February 10, 2009)