1065-49-189 **David George Caraballo*** (dgc3@georgetown.edu), Department of Mathematics and Statistics, 3rd floor, St. Mary's Hall, Georgetown University, Washington, DC 20057-1233. *On surface energy minimizing partitions of R^n into regions having specified volumes.*

I will present my proof of the existence of surface energy minimizing partitions of Euclidean space R^n (for n = 2,3,...), satisfying volume constraints, and with independent smooth surface energy densities satisfying BV-ellipticity. This work extends well-known results by Fred Almgren, who, in 1976, gave the first existence and regularity results for minimal partitions with volume constraints, using surface energy density functions which are all scalar multiples of a fixed smooth norm.

For many years, problems involving partitions of R^n have been of interest in mathematics, materials science, biology, image processing, and many other fields. It is natural to consider partitions of space into regions having specified volumes, as with materials of fixed volumes attempting to find a least-energy configuration (e.g., soap bubble clusters, immiscible fluids, polycrystals). Understanding, for instance, the possible singularities in energy minimizers would improve our insight into and ability to predict properties of polycrystalline materials, in which surface energy density functions are typically not scalar multiples of one another.

In this talk, I will focus on the existence proof but will also comment briefly on regularity of the minimizers. (Received September 13, 2010)