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Characterization of bulk and surface conduction of alloys of SmB6 using a coaxially aligned double-sided Corbino structure[1] JUNIAR LUCIEN, YUN SUK EO, DMITRI MIHALIOV, CAGLIYAN KURDAK , Univ of Michigan - Ann Arbor, BOYOUN KANG, BEONGKI CHO, Gwangju Institute of Science and Technology, PRISCILA F. S. ROSA, Los Alamos National Laboratory, ZACHARY FISK , Univ of California Irvine — It is well-known that the transport properties of topological Kondo insulator SmB_6 can be altered by introducing either vacancies or substitutional atoms in the Sm site. Previous studies have reported that SmB_6 would still exhibit an activated behavior as well as a robust low-temperature resistance plateau in the dilute doping limit, whereas it may have a metallic bulk in the high limit. In some cases, the resistance plateau value is a few orders of magnitude lower than that of pure SmB_6. This is difficult to explain within the topological insulator framework because increased disorder would normally result in lower mobility and therefore higher resistance. To resolve this issue, we studied samples with either vacancies or La substitution using a coaxially aligned double-sided Corbino geometry, which allowed us to extract temperature-dependent surface and bulk conductivities from a single sample. In a sample with 25% La, we found the material to be a bulk conductor. On the other hand, for a sample with 25% vacancy in the Sm site, we found the bulk to be truly insulating and the surface conductivity to be similar to that of pure SmB_6, which is inconsistent with previous reports. We will discuss the possible origins of these inconsistencies.

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