Review of: "The number of free electrons per atom in a metallic conductor"

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Potential competing interests: No potential competing interests to declare.

Review report

Free electron model and tightly bind electron model are widely used in theoretical treatment of solids. Drude/Sommerfeld theoretical treatment of metals falls in either of the two theoretical models.

There is still a question about the Drude/Sommerfeld model for instant it doesn't predict the specific heat of solids correctly as we know until Einstein's corrections to the classical Drude/Sommerfeld predictions. We need to consider both the electron and phonons(vibrating ions).

The classical Drude/Sommerfeld model is an approximation of the quantum treatment for higher exited energy states measured in terms of kT energy unts. The distribution of electrons or number of free electrons is energy and temperature dependent as

$$e^{-\frac{E}{k_B T}}$$

or

$$n = n_o e^{-\frac{E}{k_B T}}$$

Thus

n_o is the value of the number of electrons at equilibrium of a normal metal.

Question 1 Your claim that number of free electrons per atom are fewer than the conventional value. Is this value calculated for room temperature or absolute zero temperature at ground state? The same for calculation of drift velocity.

Question 2 Do you mean the conventional values are experimental measured values? If so, do you mean experimental values are the same as the values we obtained from Drude/Sommerfeld model? As we know Hall effect experiment is used to measure number of charge carries(free electrons) in a conductor.

Question 3 is density of charge carriers(free electrons) calculated per atom or in unit volume of a conductor?

Question 4 is the drift velocity(including mean free time and length) you are referring calculated in free electron model or tightly bind electron model?