Contactless Measurement of Electrical Conductivity of Supercooled Antimony

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Antimony is increasingly being used in the semiconductor industry in the production of diodes, infrared detectors, and Hall-effect devices. As an alloy, this metalloid greatly increases lead's hardness and mechanical strength. The objective of this research was to determine the electrical conductivity of antimony at different temperatures, including solid and melt and under supercooled conditions. The experimental setup used a rotating electromagnetic field to create a rotational force on a cylindrical antimony sample sealed in a quartz ampoule. The force was determined and the electrical conductivity was calculated. It is found that the electrical conductivity decreases with increase temperature in the solid phase. Upon melting, the electrical conductivity increases significantly, and maintained at that level with a slight decrease as the temperature further increases. The supercooled antimony has the electrical conductivity as an extension of the trend above melting point, indicating that the structure of the supercooled melt is likely to be similar to that at saturation conditions This paper also discusses the details of the measurement and the implications of the results.