World Academy of Science, Engineering and Technology
International Journal of Physical and Mathematical Sciences
Vol:10, No:02, 2016

# Highly Conductive Polycrystalline Metallic Ring in a Magnetic Field

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**Abstract :** Electrical conduction in a quasi-one-dimensional polycrystalline metallic ring with a long electron phase coherence length realized at low temperature is investigated. In this situation, the wave nature of electrons is important in the ring, where the electrical current I can be induced by a vector potential that arises from a static magnetic field applied perpendicularly to the ring’s area. It is shown that if the average grain size of the polycrystalline ring becomes large (or comparable to the Fermi wavelength), the electrical current I increases to ~I0, where I0 is a current in a disorder-free ring. The cause of this increasing effect is examined, and this takes place if the electron localization length in the polycrystalline potential increases with increasing grain size, which gives rise to coherent connection of tails of a localized electron wave function in the ring and thus provides highly coherent electrical conduction.

**Keywords :** electrical conduction, electron phase coherence, polycrystalline metal, magnetic field
**Conference Title :** ICCTP 2016 : International Conference on Computational and Theoretical Physics
**Conference Location :** Paris, France
**Conference Dates :** February 22-23, 2016