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Abstract

Deposition of Molybdenum-Carbide thin films by Dense Plasma Focus Device

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Abstract:

This work is motivated by the promising physical, chemical properties of molybdenum carbide such as high melting point, high resistance to corrosion and oxidation, and good electrical conductivity, and its catalytic activity in several applications such as the production of sustainable energy and fuels, the decomposition of hydrazine in the micro thrusters of satellites, water-gas shift reaction, etc. However, the films have some defects such micro-cracks, micro-craters, rough surfaces and impurities like silicon and silicon carbide, but it's the first ever successful attempt to deposit molybdenum-carbide (Mo2C) thin films using dense plasma focus (DPF) device. The samples were processed by multiple number (5, 10, 15 and 20) of focus shots, and characterized by several techniques such XRD, SEM, Ellipsometry and Four-Point Probe. The XRD results showed the dependence of crystallinity on number of shots. The crystallinity was increased by increasing number of focus shots. The SEM images showed non-uniform films with some surface defects such as micro-cracks, micro-craters and rough surface. The ellipsometry technique showed the increase in the film thickness by increasing the number of focus shots. The electrical conductivity of the films measured by four-point probe technique, first increased for 5 shots and 10 shots and started to decrease by further increasing the number of focus shots to 15 and 20. The maximum electrical conductivity of the film (~4.14 ×10^(-2)/Ω-cm) was observed for 10 focus shots, which is unfortunately, very much less than the actual electrical conductivity of molybdenum carbide (~1.75 ×10^4/Ω-cm), which was attributed to the presence of silicon (insulator at room temperature) in the films.

Biography:

Mr. KISHAWAR KHAN has completed his Mphil. in

Applied Physics in August 2016, from Government College University, Lahore, Pakistan under the supervision of Prof. Dr. Riaz Ahmad (Head of Physics Department, Government college University Lahore). He has yet not published his work. He served as Lecturer in Physics at Government Degree College (GDC) Mingora Swat and now performing his duties as Lecturer in Physics at International School and College, Swat, Pakistan.

Publication of speakers:

1. Khan, Kishwar & Aftab, Sarwat. (2000). Consumer Protection in Islam: The Case of Pakistan. Australian Economic Papers. 39. 483-503. 10.1111/1467-8454.00106.
2. Khan, Kishwar & Aftab, Sarwat. (2000). Uruguay Round Agreement: The Interface Between Anti-Dumping and Competition. THE LAHORE JOURNAL OF ECONOMICS. 5. 61-71. 10.35536/lje.2000.v5.i1.a3.
3. Khan, Kishwar & Mansoor, Sarwat. (1996). A Strategy for Consumer Protection in Pakistan. The Pakistan Development Review. 35. 1003-1017. 10.30541/v35i4IIpp.1003-1017.

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