EPJ AP

Issue	Eur. Phys. J. Appl. Phys. Volume 71, Number 3, September 2015
Article Number	31302
Number of page(s)	13
Section	Surfaces and Interfaces
DOI	https://doi.org/10.1051/epjap/2015140439
Published online	27 August 2015

Eur. Phys. J. Appl. Phys. (2015) 71: 31302
https://doi.org/10.1051/epjap/2015140439

A review-application of physical vapor deposition (PVD) and related methods in the textile industry

Sheila Shahidi[1a], **Bahareh Moazzenchi**[2] **and Mahmood Ghoranneviss**[2]

[1] Department of Textile, Arak Branch, Islamic Azad University, Arak, Iran

[2] Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran

[a] e-mail: sh-shahidi@iau-arak.ac.ir

Received: 6 November 2014
Revised: 22 February 2015
Accepted: 23 July 2015
Published online: 27 August 2015

Abstract

Physical vapor deposition (PVD) is a coating process in which thin films are deposited by the condensation of a vaporized form of the desired film material onto the substrate. The PVD process is carried out in a vacuum. PVD processes include different types, such as: cathode arc deposition, electron beam physical vapor deposition, evaporative deposition, sputtering, ion plating and enhanced sputtering. In the PVD method, the solid coating material is evaporated by heat or by bombardment with ions (sputtering). At the same time, a reactive gas is also introduced; it forms a compound with the metal vapor and is deposited on the substrate as a thin film with highly adherent coating. Such coatings are used in a wide range of applications such as aerospace, automotive, surgical, medical, dyes and molds for all manner of material processing, cutting tools, firearms, optics, thin films and textiles. The objective of this work is to give a comprehensive description and review of the science and technology related to physical vapor deposition with particular emphasis on their potential use in the textile industry. Physical vapor deposition has opened up new possibilities in the modification of textile materials and is an exciting prospect for usage in textile design and technical textiles. The basic principle of PVD is explained and the major applications, particularly sputter coatings in the modification and functionalization of textiles, are introduced in this research.

Atmospheric-air plasma enhances coating of different lubricating agents on polyester fiber
Eur. Phys. J. Appl. Phys. 56, 10801 (2011)

Hard coatings
J. Phys. IV France 03, C7-933-C7-941 (1993)

More

Bookmarking

Reader's services
Email-alert

The European Physical Journal Applied Physics (EPJ AP)
Editors-in-Chief: Virginie Serin and Luis Viña - Editorial board
ISSN: 1286-0042 - eISSN: 1286-0050
Frequency: monthly
Copyright / Published by: EDP Sciences

Physical vapor deposition (PVD) is a coating process in which thin films are deposited by the condensation of a vaporized form of the desired film material onto the substrate. The PVD process is carried out in a vacuum. In the PVD method, the solid coating material is evaporated by heat or by bombardment with ions (sputtering). At the same time, a reactive gas is also introduced; it forms a compound with the metal vapor and is deposited on the substrate as a thin film with highly adherent coating. Such coatings are used in a wide range of applications such as aerospace, automotive, surgical, medical, dyes and molds for all manner of material processing, cutting tools, firearms, optics, thin films and textiles. The main areas of application for physical vapor deposition processes are thin films used in optical, optoelectronic, magnetic and microelectronic devices. Other applications may be found in the areas of tribology, corrosion protection, thermal insulation, and decorative coatings amongst others [10, 11]. In the present comparative study, the important physical vapor deposition methods of thin films were studied. This study discusses about deposition principle, working principal, process of physical vapor deposition, their significant in the whole process of a making a substrate deposition or single wafer, advantages, disadvantages and limitations in their applications. DISCUSSION. Physical vapor deposition (PVD) and chemical vapor deposition (CVD) are two categories of vapor deposition processes. Vapor deposition (either physical or chemical) is a coating process where the coating material is condensed in vacuum at the substrate from vapor phase, forming a thin film (≤10 μm in the case of physical deposition and ≤1000 μm in the case of chemical deposition). Sometimes, the deposited material further reacts with the gaseous substances to form a final compound coating. In view of the wide employment of PECVD in the surface functionalization of various materials, researchers studied different methods [20, 21]. Here are further descriptions of some of these examples.