J Nanomed Nanotechnol 2013, 4:6
http://dx.doi.org/10.4172/2157-7439.S1.015

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Nanotek & Expo

December 02-04, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Nano-analysis of transition metal/silicon interface

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Atom probe tomography (APT) is a microscopic technique which has a unique capability to analyze thin films reactions in 3D. It has an outstanding resolution of 0.05 nm in depth and 0.01 nm laterally. In addition to that, the chemical/isotopic nature of the species is determined with the aid of time of flight (TOF) mass spectrometry. The technique works on the principle of field evaporation from a sample in the shape of sharp needle. Lateral distribution of the evaporated atoms is gained by position sensitive detector. The depth profiling is calculated from the data sequence and the shrinkage of the sample during field evaporation.

The standard APT with high voltage pulses was limited to the highly conductive metals and alloy, but with the introduction of short laser pulses, APT overcomes the limitations and now the analysis semiconductors, insulating materials and even polymers became possible.

In this work, the interfaces atomic structure between transition metals (M) and amorphous Silicon (a-Si) at M/a-Si/M sequence have been investigated using Laser-assisted atom probe tomography (APT).

An intermixed zone was measured with a more or less continuous transition and around 6±1 nm width is observed for the M on a-Si stacking. In contrast, a much sharper interface of less than 1.4±0.4 nm width for the a-Si on top of M. This asymmetric behavior was found to be even more pronounced after a short (10-30 min) annealing at temperatures higher than the deposition temperature (room temperature). The same behavior was observed in case of planer geometry investigated by SNMS, which confirms the existence of the asymmetric behavior.

Biography

Mohammed Ibrahim completed his M.Sc. at the age of 26 years from Linkoping University-Sweden in 2006. He is now a Ph.D. student at University of Muenster-Germany.

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Delivery of chemotherapeutic agents using nano-technology

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Delivery of drugs using nanotechnology has proved to be an efficient strategy to release the drugs at the target site in the body. The major advantage is that they transport high amounts of chemotherapeutics to the target tissues thereby reducing the side effects on the normal tissues. So Nano-technology appears to be a lucrative alternative in terms of delivery of chemotherapeutics which are already present in the market instead of developing new chemical moieties which itself is a tedious and costly affair. In other words we can say that Nano-technology has enabled the delivery of old drugs in new clothes. Nano-technique has given successful marketed formulations like FDA approved Doxil, DaunoXome and Abraxane. The area has been even extended for delivery of recombinant proteins and vaccines which are very difficult to deliver by conventional methods of drug delivery. Despite exhaustive research and development, only a few number of nano-technology based drug delivery systems are available commercially. So still there is ample scope for the design of nano-technology based medicines which can be of therapeutic value. Besides their application as drug delivery systems they are also presently being explored for their potential use as imaging and diagnostic agents.

The present talk will focus on the use of various polymer-based nanoparticle formulations which provides safe and effective delivery of chemotherapeutic agents. In addition methods to prepare, characterize nanoparticles and their future potential will be discussed.

Biography

Mohit Mahajan did his M. Pharm (Pharmaceutics) and B. Pharm from Department of Pharmaceutical Sciences and Drug Research, Punjabi University, India. He is presently serving as assistant Professor in the Department of Pharmaceutical Sciences, Guru Nanak Dev University, Amritsar. He has been teaching for more than a year now and has 3 years of research experience. He has published 1 research paper in reputed international journal. His main areas of interest are bioadhesive drug delivery systems and nano-particle based drug delivery systems.

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