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MS for characterization and analysis of inorganic and nano materials - mass spectrometer as a kind of synthesizer

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Mass spectrometry (MS) is one of the most important techniques to fulfil demand for chemical/structural information from biological systems. Structural analysis of organic compounds, biomolecules, etc. is well known and widely used. Inorganic materials extensively penetrate to medicine as drugs, nano-carriers for drug delivery and also to MS as matrices (nano-gold, nano-diamonds) or as SALDI (Surface Assisted Laser Desorption Ionisation) or SELDI (Surface Enhanced LDI) matrices - to enhance ionisation. However, MS of inorganic materials requires different approach: (i) mostly, usual MALDI matrices cannot be used, (ii) instead of MALDI just LDI is to be applied, (iii) fragmentation of materials (mostly unknown) accompanies LDI and should be taken into account, (iv) interaction of the ions in plasma plume should be taken into consideration. In spite of the problems it is demonstrated that MS can be applied for characterization/analysis of inorganic materials: (a) nano-clusters (or graphene oxide, etc.) can increase ionisation of biomolecules in MALDI (b) *in situ* generated nano-clusters of mono-isotopic elements can be used as internal/external calibration standards (c) structures of amorphous chalcogenides (atomic switch memory Ge2Sb2Te5 thin films; As2Ch3S3 chalcogenides; As-S-Se or AgAsS2 glasses; complex glasses (GeSe2)(100-x)(Sb2Se3)(x), etc. can be elucidated or determined (d) MS can be used for laser ablation synthesis (carbides, selenides, etc.) of novel compounds. Concluding, even if the fragmentation accompanying often MS of inorganics is not completely known, MS is useful for materials analysis and in addition the instrumentation can be as a kind of a synthesizer applied for generation of new compounds.

Biography

Josef Havel has completed his PhD from Masaryk University and Postdoctoral studies from The Royal Institute of Technology, Stockholm, Sweden. He is Full Professor and Head of MALDI TOF MS laboratory. He has published more than 500 papers in reputed journals and has been serving as an Editorial Board Member of repute.

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