EVC 16
16th European Vacuum Conference

22-26 November 2021, Marseille, France
www.evc16.org

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Argon cluster ions for surface analysis

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Ten years ago, argon cluster ion sources became available on commercial surface analytical equipment and revolutionised the analysis of materials which contain organic compounds. Their utility has been proven for compositional depth profiling [1] of organic electronic, polymeric and drug delivery as well as the preferential removal of organic layers from inorganic compounds such as photoresist residue from graphene without significant damage [2]. The key feature of gas cluster ions is the ability to remove organic compounds with almost no discernible damage to the underlying material. The ejected material is also relatively undamaged [3] meaning that intact molecules form most of the ejecta which has important consequences for molecular analysis using, for example, secondary ion mass spectrometry [4]. Recent work has developed this observation to transfer ionisation-enhancing molecules to surfaces [5,6] and even proteins which retain functional activity [7] or can be fragmented to provide proteomic analysis [8]. This talk will provide an overview of the development of argon cluster beams, their applications and their use in understanding fundamental processes in surface analysis, such as the SIMS matrix effect [9].

References:

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[9] Shard et al Int J Mass Spectrom 2015, 377, 599.