# Evaluation of $C_{60}$ Depth Profiling Conditions for XPS Organic Films Analysis

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Abstract:

Type-II organic materials can be successfully depth profiled by XPS using $C_{60}$ ion beam sputtering at room temperature. Success is defined by achieving correct steady state composition as a function of depth. However, depth profiling of Type-I polymers have been marginally successful due to rapid sample damage under $C_{60}$ bombardment. The use of high $C_{60}$ beam energy at a glancing angle has been shown to extend the maximum depth of successful depth profiling, yet it eventually fails due to sample roughening, concomitant carbon build up, and a significant reduction in sputter rate.

Zalar™ (azimuthal) rotation has been shown to minimize sputter induced roughness formation, improve depth resolution in multi-layer film structures, and allow depth profiles to be extended to even greater depths. Cooling of the sample to below its glass transition temperature is expected to reduce the mobility and reactivity of free radicals that are formed during the sputtering process.

The purpose of this study is to evaluate the relative importance of using Zalar™ rotation and sample cooling to characterize standard organic thin film structures and to quantify the benefit to using them simultaneously.