

Latest Developments in Tools for Life and Materials Sciences: Quorum Technologies Ltd Recent Improvements to Existing Coater Instrumentation

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Quorum Technologies Ltd is the market leader in designing, manufacturing and distributing sample preparation and Cryo preparation products to support electron microscopy instruments. 2010 saw the launch of the highly successful Q series coaters, and the interim period has seen a number of key instrument improvements. Three significant developments for Q150 and Q300 model coaters are discussed.

Firstly for the Q150TE and Q150T ES series of coaters, a ramped current carbon evaporation profile was introduced. This is suitable for several applications, but in particular to produce consistently repeatable ultra thin, highly electron transparent films or holey carbon support layers for TEM. Such films often need to endure a rigorous sample preparation regime as well as remaining stable under all EM operating conditions ^[1].

Variable carbon coating thicknesses are often a source of error in quantitative microprobe analysis ^[2]. This error is often greater when examining the lighter elements. For quantitative comparison of samples it therefore becomes necessary for all the samples to be coated at the same time, which on most occasions is impractical. Thus an ability to form a reproducible thickness of carbon layer is highly important and offers both flexibility and confidence for comparative analysis without the need to coat the samples simultaneously.

Quorum Technologies have developed a practical solution to both these issues in the form of a ramped current carbon profile which is designed for use with the Q150 carbon evaporators. This combines a purposely designed carbon rod shape (Fig. 1) and a user configured carbon coating protocol (Fig. 2) where enhanced control and reproducibility of thickness deposition can be achieved.

The Quorum Q300 series of coaters has also seen new improvements. This includes an addition to the range in the form of the Q300T ES, which incorporates a novel conductance monitor for evaporated film thickness termination (Figure 3). This accessory continually monitors the resistance of the film being deposited on to a controlled surface, which is proportional to the resistance of the film on the substrate. The coating process may then be terminated at a preset resistance. This monitor can be used in the Q300T ES in conjunction with a recently improved evaporation profile which utilises feedback from the monitor to control the current increment of the evaporation source.

For the existing Q300T T coater, a larger chamber is introduced which suitable for the coating of substrates up to 12" diameter (Fig. 4). This accessory includes a stage for 12" wafers which can be manually loaded on the height adjustable stage. The drawer mounted stage is inserted into the chamber on guide rails and is automatically connected the Q300T T stage rotation drive mechanism. Coating can be observed through a front facing window. The complete 12" chamber accessory may be easily removed from the Q300T T and be replaced by the conventional glass cylinder.

References:

[1] Young-Min Kim *et al* (2007). Ultrathin Carbon Support Films for High-Resolution Electron Microscopy of Nanoparticles. *Microscopy and Microanalysis*, 13, pp 285-290.

[2] Derrill M. Kerrick, Leland B. Eminghizer, James F. Villaume, (1973). The Role of Carbon Film Thickness in Electron Microprobe Analysis, *American Mineralogist*, Volume 58, pp 920-925.

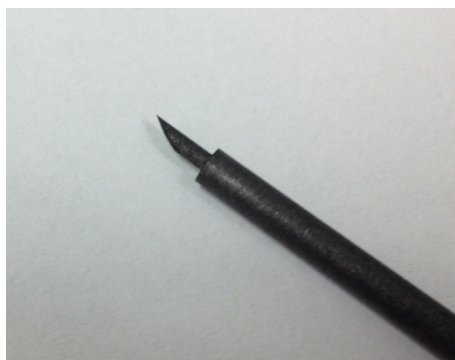


Figure 1. Wedge shaped carbon rod

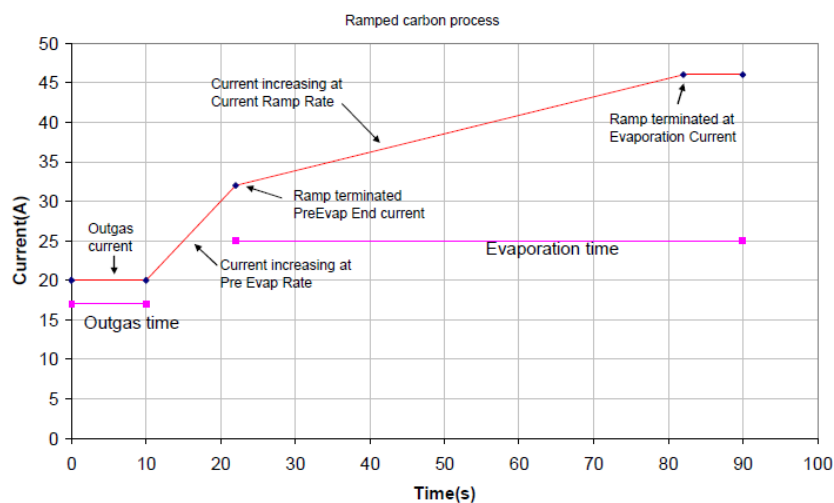


Figure 2. Ramped current carbon profile

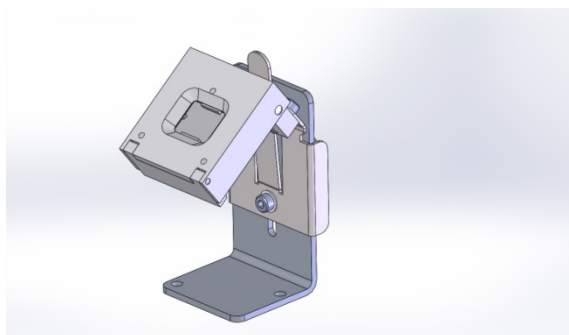


Figure 3. Conductance monitor

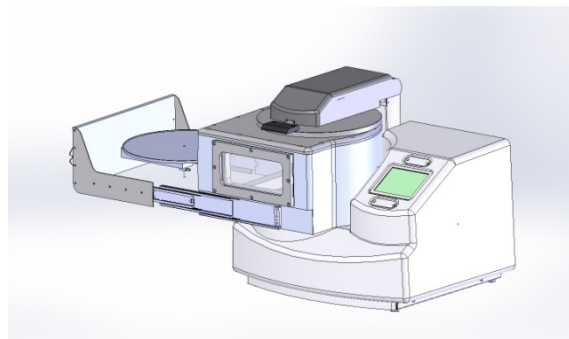


Figure 4. Large chamber Q300T T coater