the 10 nm to 100 nm discrepancies that had been observed in earlier work on the different samples [8, 9]. Additional modeling then indicated that those discrepancies could be explained by considering the much larger sidewall angles of the earlier samples, coupled with the different response of SE vs. BSE/LLE linescans and measurement algorithms to those wall angles. Clearly, serious measurement errors would be encountered in such cases if measurement algorithms were applied blindly without considering the underlying physics provided by applying model-based metrology.

CONCLUSION

In summary, this paper has: (1) demonstrated, for the first time, by simultaneous imaging that the previously observed bias between SE and LLE/BSE images is indeed real, not just an artifact of charging, drift, detector positioning, or some other instrument - or measurement-related error; (2) documented the measurement variation inherent in algorithm choice both on modeled and experimental data; (3) clearly pointed out that modeling of the image formation is necessary for highly accurate measurements, and (4) explained the previously observed mysterious size difference in the measurements with a simple phenomenological model and by a more complete Monte Carlo model.

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11. *https://www-s.nist.gov/srmors/view_detail.cfm?srm=8820*

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KEYWORDS

scanning electron microscope, SEM, JMONSEL, modeling, metrology, secondary, backscattered, low-loss electron