Comparative Advancements in EBSD Pattern Matching: Spherical Indexing and Simulation-Based Approaches with real samples

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The study focused on how advanced "post-processing" approaches handle actual samples with poor patterns and how quickly we can improve the real-sample challenges. The comparison between EDAX's OIM Matrix™ and Oxford Instruments' MapSweeper reveals two distinct approaches to electron backscatter diffraction (EBSD) pattern analysis, both emphasizing pattern-matching techniques over traditional methods.

MapSweeper from Oxford builds on advances in EBSD pattern simulation and image correlation. Rather than using conventional Hough-based indexing, which identifies Kikuchi bands by comparing interplanar angles, MapSweeper leverages highly accurate simulated patterns that account for both the position and intensity of bands. This allows for more precise matching between experimental and simulated patterns, enhancing the accuracy and functionality of EBSD analysis, making it faster and more versatile. On the other hand, EDAX OIM Matrix™ utilizes a spherical indexing approach and a master pattern simulation grounded in the dynamical theory of electron diffraction. By improving pattern simulation accuracy compared to kinematic approaches, EDAX enhances indexing performance and achieves superior orientation precision. This technique also improves the speed of indexing to over 10,000 patterns per second, and when integrated with EDAX's NPAR™ technology, enhances signal-to-noise ratios for clearer EBSD patterns. EDAX's solution is optimized for both traditional EBSD and transmission Kikuchi diffraction (TKD), broadening its application and resolution capabilities. Both systems are advancements in EBSD by focusing on improving pattern matching accuracy through simulated diffraction patterns. While EDAX emphasizes spherical indexing and reindexing speed, Oxford's MapSweeper enhances indexing accuracy and adaptability through innovative simulation techniques.