2002
DOI: 10.1017/S1431927605503374
Microsc Microanal 11(Suppl 2), 2005

The Particle Atlas Comes of Age: A Brief History and a New Digital Tool for Today's Microscopist

E.F. Schumacher,* J.G. Delly*

* McCrone Associates, Inc., 850 Pasquinelli Drive, Westmont, IL 60559-5539

Microscopists have been identifying particulate matter since the seventeenth century. Reference sets of study slides, identification keys and atlases to specific groups of substances were prepared throughout the eighteenth and nineteenth centuries, and into the early twentieth century, but none of these attempted to be comprehensive. Beginning in 1950, with the goal of utilizing the microscope for identification and monitoring of airborne pollutant particles, Walter C. McCrone began to test the possibility of using the microscope for general identification of all particle types. It soon became apparent that, in addition to air monitoring, the concept could be applied to industrial hygiene, manufacturing, pharmaceuticals, cleanroom monitoring and criminalistics [1].

Developed over the next 40 years in a series of volumes that were made available on CD-ROM in 1992, *The Particle Atlas* proved to be a valuable comprehensive resource for analytical microscopists. However, printing costs limited both the amount of information that could be included for each particle, and the possibility of expanding the number of particles described. It was decided that developing a new, digital version of the atlas and making it available online would best serve the needs of microscopists now and into the foreseeable future. The present edition, the *McCrone Atlas of Microscopic Particles*, has been designed as a resource for use in today's digital microscopy environment, be it a classroom, an industrial facility, or a mobile laboratory in the field.

The digital format offers tremendous advantages to both developers and users of the new atlas. *The Particle Atlas* was restricted to only one photomicrograph per particle, whereas the digital format of the *McCrone Atlas of Microscopic Particles* allows for inclusion of multiple digital images and spectra from several techniques, as well as extensive descriptions of results and methodologies. Complete characterization typically includes polarized light microscopy, Raman and infrared spectroscopies, SEM/EDS, and TEM/EDS for extremely small particles. A typical characterization viewer is shown in Figure 1. Color photomicrographs are more accurately reproduced than was possible in the printed version. Search capabilities and links to glossary terms, tutorials and technique descriptions are included, and the database will be added to on a continuing basis.

A team approach was used for development of the atlas, beginning with a defined particle set; white powders were selected, due to their importance in identification of weapons of mass destruction. John G. Delly, an author of the original *Particle Atlas*, was brought in as a consultant, and a team of microscopists, spectroscopists, and information technology specialists collaborated to prepare and analyze samples, develop the digital format, and write and review descriptions of materials and techniques. An outside firm was hired for the website development and design.

Issues encountered by the team included how to balance standardization of format with the need for flexibility, how to select specific natural or manufactured products to represent classes of materials, and how to assess the needs of atlas users. A structure for the database had to be agreed upon, along with methodologies for testing the site, and for reviewing the extensive amount of text and data that

had been generated. At the end of the initial 14-month effort, the 60-particle white powders set was completed, and the beta site was available for testing by staff and by students in white powders identification classes.

Smaller teams are continuing the work on additional particle sets including hairs, pharmaceutical contaminants, and trace evidence with the goal of adding 200+ fully characterized new particles to the online atlas each year.

The current status of the project will be described: an overview of the format and search capabilities, examples of atlas descriptions for specific materials, and collaborative efforts with developers of other digital microscopy databases will be highlighted. As microscopists learn about and utilize this new tool, their comments and contributions will be sought, so that the *McCrone Atlas of Microscopic Particles* can be improved and expanded. The concept of a comprehensive particle reference for all microscopists has evolved to take its place in the digital age.

References

[1] J.G. Delly, *A Brief History of the Atlas of Microscopic Particles*, available online at www.mccroneatlas.com.

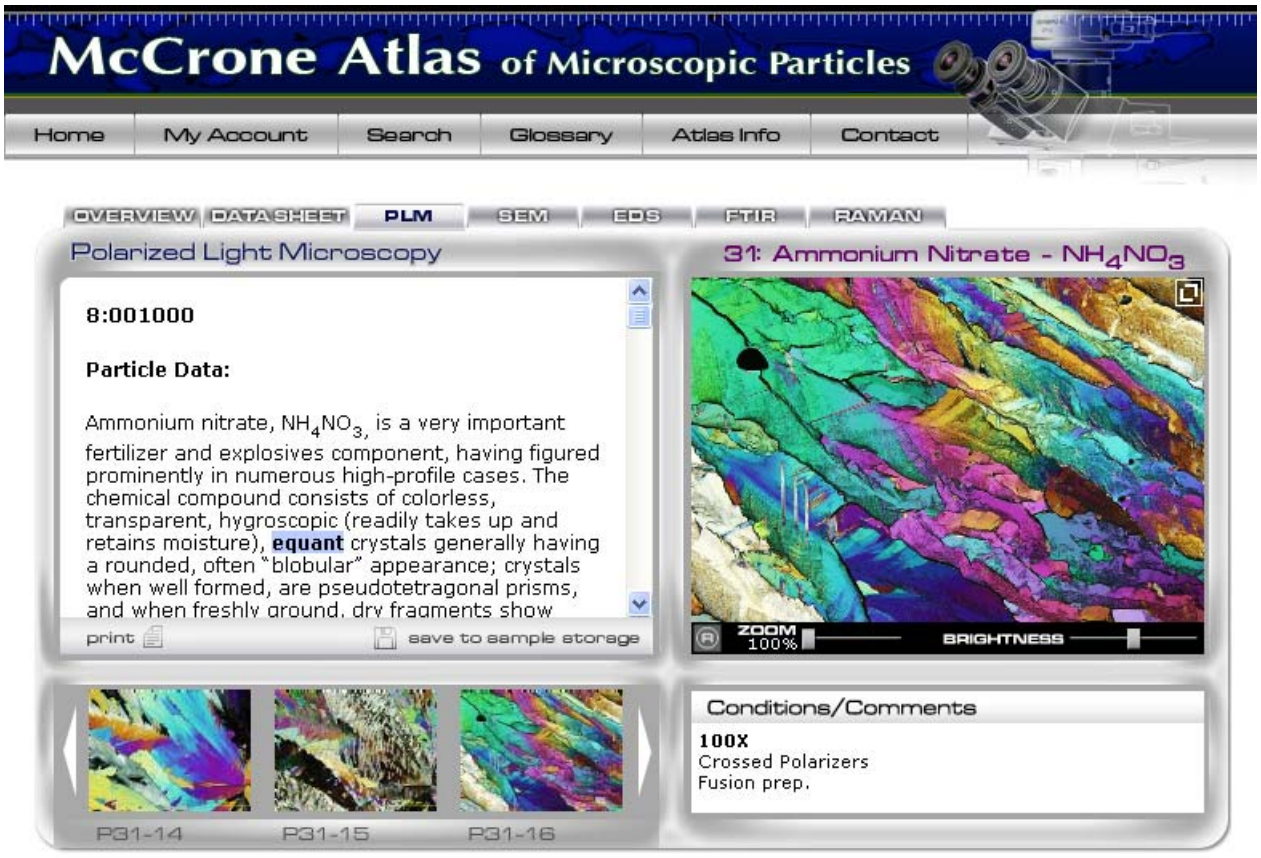

FIG. 1. Characterization viewer showing PLM data and photomicrographs, with tabs for selection of other techniques. Drop down menus for website navigation are shown at the top of the screen.

https://doi.org/10.1017/S1431927605503374 Published online by Cambridge University Press