Dispersion staining – A versatile complement to Becke line method for refractive index determination

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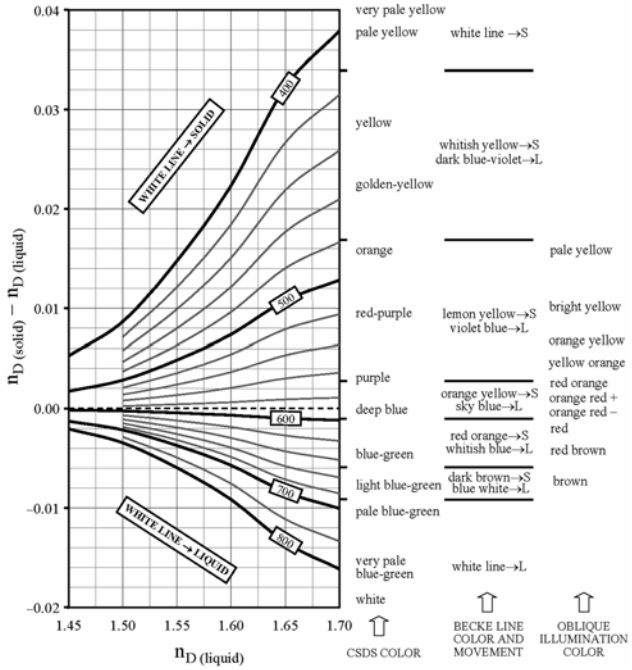
Although both Becke line (BL) and dispersion staining (DS) can be used to determine refractive index (RI) of a solid immersed in an immersion oil, DS has several advantages complementary to the BL method that make it a versatile aternative technique for refractive index determination using immersion method:

- it is very easy to estimate the RI difference between a solid in a mismatched oil using DS and quickly find the next oil to be used using the chart below;
- only DS is capable of determining 2 or 3 principal RI's for a low-birefringence solid using a single oil;
- only DS is capable of estimating the percentage of particles having a specific RI mixed with other particles with significantly different RI's;
- only DS is capable of image analysis applications to amorphous or isotropic transparent particles.

This presentation illustrates the above points with several practical application examples.



Using geographical information system (GIS) software to improve cost effectiveness and quality control in microscopical analysis

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Historically, petrographic analysis in the geosciences has been considered to be a qualitative study. The descriptive nature of textural relationships between minerals or of fluid inclusions is based on direct observation complemented by drawings, microphotographs or digital images. Although mineral identification is theoretically based on the observation and measurement of a series of optical properties in transmitted and reflected light, the credibility of the results is usually associated with the level of expertise of the petrographer. Questions can always be raised concerning the qualifications of the petrographer-micoscopist, the petrographer-microscopist's selection of the specific area of a sample that is described related to the potential heterogeneity in the sample, and observer bias. These problems can be addressed by using copious detailed notes and many images throughout the individual slide and cross checking results by observing a number of slides from the same sample. A final check can be performed using multiple reviewers to check the observations and interpretation of the petrographer-microscopist.

While today's highly sophisticated analytical techniques are extremely precise and accurate the choice of analytical location is still left to the observer. Therefore, it is still a qualitative study. Importing digital images at various resolutions into a Geographical Information System (GIS) program with a consistent set of coordinates allows the petrographer-microscopist to use the mapping skills developed in geological training to record mineral identifications, destructive and nondestructive analytical sample locations, analytical results in a structured database, textural interpretations, and notes in a single entity. Evaluating slides using this GIS technique allows for reproducible observations by colleagues, enhances communication with colleagues at great distances, and allows for colleagues to directly comment on observational features, or the need for further analytical measurements. The GIS technique enhances quality control, communication between team members, and reduces the time needed for analog-based information recordation, and creates a cost effective more reliable method of data analysis and interpretation.