A CL/PPL Based Image Analysis Technique Leads the Way to Improved Understanding of Carbonate Reservoir Systems

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This procedure combines PPL and CL images and is inherently more versatile than SEM or PPL based systems. Pore structure, grains and diagenetic fabrics are now quantifiable. This yields integrated solutions for understanding pore type distributions and the geological processes causing them.

Recent developments in integrating colour cameras enable colour image capture at low light intensities (typically generated by cold cathode CL techniques). Such cameras obtain images faster than conventional photography and optimum results are consistently obtained even from difficult samples like siliciclastics. Data are also archived onto CD-ROM for easy transport and retrieval.

Editing and analysis of calibrated images allows quantification of data giving statistical parameters such as porosity %, grain % as well as pore size distributions and percentages of different cement phases. Further manipulation including statistical comparison to a large database enables:-

i.   Present-day permeability prediction,
ii.   Pseudo-capillary pressure curve generation,
iii. Observation of diagenesis and poroperm changes through a samples geological evolution.

These permit understanding of the origin of poroperm patterns in reservoirs, enabling their 3D and 4D modeling within and between wells. These techniques are particularly relevant to many carbonate reservoirs where justification of likely reservoir quality is needed for drilling step-out wells and where facies do not control reservoir quality, e.g., due to strong overprint of diagenesis or fracturing.