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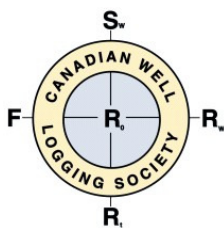
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Please see the CWLS Website at  
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**Notes:** Please forward this notice  
to any potentially interested co-  
workers. Thank you.



## CANADIAN WELL LOGGING SOCIETY

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### Wednesday, January 13<sup>th</sup>, 2010 CWLS TECHNICAL LUNCHEON PRESENTATION FAIRMONT PALLISER HOTEL 133, 9TH AVE. S.W. CALGARY

TIME: 12:00 PM (COCKTAILS AT 11:30 AM)

**RESERVATIONS BY: Friday, January 8th, 2009 (NOON) - CALL 269-9366 TO CONFIRM A SEAT**

**COST:** MEMBERS RESERVED MEAL: \$35.00; NON-MEMBERS RESERVED MEAL: \$40.00  
(SPECIAL NEEDS MEALS AVAILABLE WITH ADVANCED BOOKING ONLY; PLEASE  
REQUEST WHEN ORDERING TICKET)

**TOPIC: Coal Characterization by Core-Flood, X-Ray CT and Low-field NMR**

**SPEAKER: Dr Rong (Grace) Guo**

#### ABSTRACT:

Coalbed Methane, as a new energy source, has potential to be a significant natural gas production contributor in Canada. This project investigated the transport phenomena of coalbeds and developed novel techniques to characterize CBM reservoirs by a combination of multi-stage core-flood experiments, x-ray CT scanning, and low-field NMR measurements. A coal sample from the Alberta Mannville formation was used to measure the fundamental flow properties, identify flow paths pertinent to CBM/ECBM, characterize coal contained fluids, and determine the adverse effects of CO<sub>2</sub> on coal permeability.

This study quantitatively reveals the dependency of coal permeability on stress, stress history, and gas adsorptive capacity, and also demonstrates the associated hysteresis. Gas adsorption causes further permeability reduction besides the stress effect, about 34% for methane and 73% for CO<sub>2</sub> at tested pressure range. Gas adsorption and desorption in coal are variable rate processes with a power law relationship for gas desorption. Significant amount of CO<sub>2</sub> gas can be adsorbed in coal before CO<sub>2</sub> breakthrough during CO<sub>2</sub>-ECBM.

The X-ray CT imaging technique is a powerful tool for coal characterization and flow path visualization. The analysis of X-ray CT images shows that the stress, gas adsorption, and gas production history are key factors affecting coal structure, leading coal density, fracture area, and volumetric strain variations. Hence, the core flow path, which contributes to the coal permeability, changes with those factors during CBM/ECBM processes. The sorption-induced volumetric strain in coal must be accounted for when modeling permeability changes.

Low-field NMR has shown great potential to be a useful tool for coal moisture and gas content characterization as well as coal wettability detection. The interactions of coal-water-gas can identify coal contained fluids as coal-adsorbed, porous media confined, and bulk phase  $T_2$  regions. Accuracy of the moisture analysis depends on the water format in coal. Adsorbed methane magnitude measured by Low-field NMR follows the Langmuir type correlation with gas pressure. Coal wettability is affected by CO<sub>2</sub> injection and it closely relates to the gas adsorption capability. The presented results have important implications for the CBM reservoir exploration and development.

#### BIOGRAPHY

Rong (Grace) Guo works for Shell Canada Limited as a Reservoir Engineer. She graduated with a Ph.D. degree in 2008 and a M.Sc. in 2003 in Chemical and Petroleum Engineering from the University of Calgary. She obtained her B.Sc. degree from Sichuan University, P.R. China in 1993. Grace has worked as a Research Engineer at the TIPM Laboratory prior to joining Shell. Her research focused on unconventional gas with respect to the transport phenomena of coalbeds and coal characterization using novel techniques. Grace has the award of the *Dr. S.M. Farouq Ali* Best Paper Published in the Journal of Canadian Petroleum Technology (JCPT) 2007. Besides, she has been a NESERC PGSD Scholarship holder for the year of 2005-2007 and also the winner of several other scholarships such as the SPE scholarship and CSUG awards during her graduate study. She is a member of APEGGA, CSChE, SPE and the Petroleum Society of CIM.