

## **Analysis of unconventional mudrocks in the ESEM, preparation of samples using the ion mill versus mechanical polishing**

Elizabeth C. Lacsamana<sup>1</sup>, Ali A. Al Zahrani<sup>1</sup>

<sup>1</sup>GLTSD, ARAMCO, Dhahran, SAUDI ARABIA

### **ABSTRACT**

Environmental scanning electron microscopy (ESEM) is commonly utilized in the assessment of grains, cements and pores within rock samples. The technique is particularly useful in the evaluation of reservoir properties as it allows determination of pore volume, pore types, pore location, and pore connectivity. One of its main uses is in unconventional mudrocks where much porosity occurs within organic matter. Assessing the volume and architecture of these “organo-pores” is important as they provide storage sites and potential permeability pathways for hydrocarbons. The organo-pores typically occur on nanometer scale and are difficult to observe in standard mechanically polished SEM samples, due to smearing and sample relief. The best way to image the organo-pores is to use a non-contact polishing technique, e.g., argon ion milling. The technique involves bombardment of Argon ions at the surface of the sample to remove material at the atomic level. This results in a completely smooth, almost flat surface with no plucking and smear marks, allowing imaging of the organo-pores under the ESEM. High magnifications (>X100, 000) can be achieved without the need for a sample coating.