either existing sediment minerals, typically Fe-bearing, or particles of a solid-phase redox reagent such as Fe(0) or CaO_2. A detailed discussion is devoted to a dithionite barrier formed by reaction of aqueous $S_2O_4^{2-}$ with clay minerals. The article ends with a brief description of Fe(III) acting as an oxidant.

Chapter 4, by Gilles Villemure, 'Electron Transport in Electrodes Modified with Synthetic Clays Containing Electrochemically Active Transition Metal Sites', in my opinion relates logically to chapters 1 and 2 and may have been edited with them. It shows how clay-modified electrodes can control the electron transfer processes at the electrode-solution interface. Electron transport in clay-modified electrodes is a complex process involving various diffusion contributions. Although $[M(bpy)_3]^{n+}$-type cations interact readily with the clay surface, they exhibit only small electroactive fractions incorporated in the clay film. A more efficient electron transport can be achieved by means of electron acceptor/donor sites in the clay structure. Synthetic clays containing redox active Fe, Co or Cu centers provide electron self-exchange between the oxidized and reduced forms of centers. Many examples provided prove the mediation of the charge transport in chemically modified electrodes by redox-active transition metal sites in the clay layers. Experiments with layered double hydroxides as the electrode modifiers confirm this charge transport mediation by means of Ni, Co or Mn sites, too. In addition, layered double hydroxide-modified electrodes have recently begun to be used widely in the field of electroanalysis, and so I was pleased to find the section on electrodes modified with layered double hydroxides.

Chapter 5, by Evangelos Manias, Athanassios Z. Panagiotopoulos, David B. Zax and Emmanuel P. Giannelis 'Structure and Dynamics of Nanocomposite Polymer Electrolytes', describes recent research and development on batteries based on polymer electrolyte. Unlike the other chapters, this is original experimental work on designing polymer electrolytes by intercalation of polymers in phyllosilicates. The authors use both experimental and computer simulation means to study the structure and dynamics of poly(ethylene) oxide nanocomposite electrolytes. The greater ionic conductivity, compared with conventional electrolytes, makes nanocomposites promising electrolyte material.

This book covers the subject of electrochemical properties of clays extremely well. The editor has not only gathered a comprehensive overview of the topic but has also indicated possible trends in the research in this field. All of the papers are adequately documented with references, but page numbers, particularly for books, have been missed out in places (chapter 1). I could identify only one topic that I felt was not covered – electroanalytical applications of clay-modified electrodes. However, this subject would probably require a CMS workshop all of its own! *Electrochemical Properties of Clays* would be a useful addition to bookshelves of either the clay or electrochemical specialist.

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Clay Mineral Cements in Sandstones, edited by Richard H. Worden and Sadoon Morad. Special Publication Number 34 of the International Association of Sedimentologists, 2003; 489 pages. Blackwell Science Ltd., Oxford. [ISBN: 1-40510-587-9] Price £75.

This special publication by the International Association of Sedimentologists (IAS) is meant to complete a compendium on cementational processes in sandstones. The topic is becoming an increasingly important focus area from the perspective of groundwater resource management/treatment as well as enhanced hydrocarbon recovery. This volume consists of 12 review papers addressing the geologic controls on clay mineral diagenetic cements, stable isotopic compositions and radiometric methods, effects on physical properties including permeability, water saturation, porosity, *etc.* and quantitative analysis by X-ray diffraction. These papers are followed by nine case studies dealing with the specific clay minerals chlorite, kaolinite, illite and glauconite. Smectite is dealt with in a review paper in the former section of the volume.

In setting the stage for the controls, distribution and evolution of clay mineral cementation, the editors valiantly attempt to integrate depositional, climatic and sequence stratigraphic processes with increasing diagenetic grade. The uninitiated reader will probably find this treatment difficult to grasp, particularly when some resulting inconsistencies become evident at the end of the paper. The editors correctly identify the importance of sandstone wettability on diagenetic processes and reservoir properties. Unfortunately, recent oil-production experience gained from North Sea carbonate sequences, which challenges conventional wisdom on this issue, has not been incorporated into their perspectives. Regarding the breadth and balance of opinion reflected in the volume, this reviewer found them to be narrow. It is perhaps telling that the editors are either authors or co-authors for the first five papers, and for seven of the volume's 21 contributions. Greater priority should have been given to capture other important views on diagenetic reaction pathways, mass balance and chemical transfer between mudrocks and sandstones. It is to their credit that subsequent authors have attempted to address the strengths and weaknesses of key arguments, and if for this reason alone, the contributions do provide some insights into the scientific debates surrounding important points of controversy. Given the wealth of subsurface information on

reservoir properties and fluid compositions currently available, it is unfortunate that such evidence was not incorporated into the discussions, particularly for the Texas Gulf Coast. A bright spot in terms of contributions comes from S. Hillier in the form of quantitative clay mineral analysis in sandstones with a decidedly rigorous treatment of analytical errors, and methods by which to reduce them. One may question whether this publication is the optimum forum for such a contribution. Similarly, the valuable review on radiometric dating by P. Hamilton is thorough and up to date.

The case studies provide an opportunity to examine more recent documentation of clay mineral occurrences. One could rightly question whether review articles would have been more appropriate for this publication. Although interesting and generally well researched, the specific examples are not necessarily the best or geologically most representative. This is particularly true for chlorite, because there is only one case study provided, of Upper Cretaceous sandstones from offshore Brazil. The chlorite in these marine turbidite and shelf sequences is concluded to have formed from volcanic rock fragment precursors. While in itself interesting and well presented, it is not representative of the tropical fluvial-to-marine depositional setting often associated with porosity preserving Fe-chlorite-coated sandstones. There are four kaolinite case studies, two from the North Sea, one from Mesozoic fluvial to shallow marine sandstones onshore Egypt, and the other from US Appalachian Carboniferous sandstones. Two of the studies also have a diagenetic illite component, attesting to the relative importance of kaolinite as a reactant/precursor for illite diagenesis in sandstones. In this regard, the North Sea Hild Field Middle Jurassic Brent reservoirs also provide one of the following three illite case studies, the others coming from the Cooper Basin, Australia, and the well studied Upper Jurassic sandstones of the North Sea Magnus Field. The sole glauconite study is of the Lower Cretaceous Mardie Greensand from the offshore Australian North West Shelf. In this last case, the importance of ductile glauconite grain deformation and its impact on effective porosity reduction by mechanical compaction is demonstrated.

Ordinarily it is a pleasure to recommend a source of geological information into the fascinating field of clay diagenesis and cementational processes in sandstones. Although this compendium has value, with important contributions as noted above, overall it is a disappointing effort. This is particularly so given the substantial body of research in these and related areas over the last 25 years, much of it provided by offshore petroleum exploration. The dedicated worker will no doubt gain some benefit, with additional study, from the orientation provided in this special publication.

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