ADVANCES IN CLAY SCIENCE IN CHINA

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Reports of scientific investigations published in Clays and Clay Minerals address a wide range of topics covering virtually every physical and natural science and thousands of industrial products and processes worldwide. Even though these nano-sized materials occur naturally throughout the Earth’s crust, a large proportion of the studies carried out in the past regarding their origins, nature, and uses, as reported in Clays and Clay Minerals, have arisen predominantly from North America and Europe. In recent years, however, manuscript submissions from China have increased appreciably (Figure 1). In the current issue, a number of those studies were selected for a compilation in order to highlight the contributions being made by Chinese colleagues, which gives a glimpse into the types of clay research under way in that country. The manuscripts selected do not, of course, represent a comprehensive treatise of clay research in China, but rather an opportune emphasis that is intended to call attention to the work being done there.

China has a long history of using clay minerals for various applications, but scientific research on clay minerals did not start until the 1950s. Early studies centered largely on the purification of clay minerals and their crystal structure and chemistry. Rapid economic development in China over the past 20 years has led to a large demand for natural resources. Concerted efforts in mineral exploration have discovered abundant clay and clay mineral resources in China. In addition to common kaolinite, smectite, and vermiculite, large deposits of other clay minerals, such as rectorite in Hubei Province and hydrobiotite in Xijiang Autonomous Region, have also been discovered.

With advances in terms of characterization techniques, such as modern spectroscopy and electron microscopy, Chinese scientists have made important contributions to clay science research (Figure 1). They are actively involved in a number of professional organizations and international conferences. Current clay-mineral research in China is multi-faceted. In addition to traditional research on crystal structure, crystal chemistry, clay genesis, and occurrence, many Chinese scholars are heavily engaged in the characterization of clay-surface chemistry. In particular, the Chinese clay-minerals community is active in finding new applications of traditional clay minerals through surface or structural modification. Modified clays and clay minerals have found wide applications in environmental remediation, catalysis, and materials engineering.

Two papers in this issue describe new methods to synthesize various types of clay-organic and metal-intercalated nanocomposites. Fan et al. (2011) synthesized zerovalent iron/montmorillonite nanosized heterostructures through a hybridization process in which montmorillonite was impregnated with ferric ions followed by chemical reduction. The hybridized iron nanoparticles were well dispersed on the montmorillonite surface and resistant to reoxidation. These nanomaterials are expected to have promising applications in heterogeneous catalysis, adsorption, and environmental remediation. Wang, Y. et al. (2011) report a method to intercalate poly(oxypropylene) (POP) amine hydrochlorides into the interlayer space of montmorillonite. The basal spacing of modified montmorillonite increased with the hydrophobic chain length of the POP ammonium ions. After intercalation into the montmorillonite

Figure 1. Proportion of manuscripts submitted for possible publication in Clays and Clay Minerals by Chinese scientists (value for 2007 is estimated).