

## LETTERS

### Interstratification of carbonaceous material within illite

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#### ABSTRACT

We here report the first recognized natural occurrence of a clay mineral with interstratified carbonaceous material that, in places, approaches graphite in its structural ordering. Using high-resolution transmission electron microscopy (HRTEM), we found that carbonaceous material in an early stage of graphitization occurs in extremely thin ( $<100 \text{ \AA}$ ) domains both between and interstratified within illite crystals. This material could have been trapped during the growth of the illite or have been inherited from precursor clay minerals in the host sediments during diagenesis and metamorphism. Graphitization in low-grade rocks involves complicated microstructural changes in the carbonaceous material as a result of its fine-scale intergrowth with clay minerals. In addition, this study demonstrates that by utilizing ion-milled specimens, in situ structures and textures of fine-grained carbonaceous samples can be investigated without the unavoidable disruption produced by crushing or grinding.