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Yumeng Ou* (yumeng_ou@brown.edu), 151 Thayer Street, Providence, RI 02912, and **Laurent Dalenc**. *Upper bound for iterated commutators of Calderon-Zygmund operators.*

We show that the product BMO space can be characterized by iterated commutators of a large class of Calderon-Zygmund operators. This result follows from a proof of boundedness of iterated commutators of arbitrary Calderon-Zygmund operators in terms of the BMO norm of their symbol functions, using Hytonen's representation theorem of Calderon-Zygmund operators as averages of dyadic shifts. As a key element of the proof, we introduce some new dyadic paraproducts which have BMO estimates. And the main idea of the proof is to show that commutator of any dyadic shift operators can be represented as a finite linear combination of those paraproducts. (Received January 10, 2015)