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Passive optical switches based on endohedral fullerenes
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LABORATION — Although there have been many attempts to find better
nanomaterial-based optical limiters & switches in recent years, currently there are
only a few effective options for high-energy lasers. Reverse saturable absorption in
fullerenes has been widely used to realize excellent passive optical limiters for the
visible region up to 650 nm. The electronic structure of fullerenes can be modified
by the encapsulation of endohedral clusters to achieve exotic quantum states of mat-
ter such as superconductivity. Building on this concept, in this talk, we show that
three tri-metallic nitride endohedral fullerenes could alter the HOMO-LUMO gap
and allow passive optical switching with a low limiting threshold (0.3 J/cm²) and a
wider operation window up to 1064 nm (average pulse energy >0.5 mJ in ns regime).

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