

# The molecular deflection of light radiation by means of diamantane

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An international team led by the chemist Heinz Langhals of Ludwig-Maximilians Universitaet (LMU) in Munich has succeeded in the molecular deflection of light radiation by means of diamantane. Novel applications such as efficient light collectors or broadband light absorbers are promising.

Diamantane, the second smallest and thus molecular diamond, is a highly fascinating material for chemists. It can be applied as rigid spacer and stiff pillar in molecular architectures so that optically functional units can be three-dimensionally arranged in well-defined larger assemblies. Notably, the diamond allows the vibration-mediated transmission of optical energy in light-collecting systems in spite of his firmness; this proceeds according to a mechanism that was recently discovered by an international group of researchers led by the [chemist](#) Heinz Langhals of Ludwig-Maximilians Universitaet (LMU) in Munich, in which slow molecular bending vibrations play the key role.

The work refers to an international co-operation. Researchers at the University of Stanford isolated the preparatively only laboriously accessible diamantane efficiently from crude oil. Chemists in Taipei were responsible for the targeted functionalization. The researchers at the LMU Munich constructed the optical functional unit from adapted components. The newly found mechanism of [energy transfer](#) in such units causes consequences in physics because it requires a correction and extension of the theory of FRET where the familiar dipole interaction for the energy transfer is disproved as the exclusive mechanism and slow molecular vibronic processes have to be considered. On the other hand, this allows a 90-degree deflection of light simulating a 45-degree oriented molecular mirror useful for optical devices such as solar [light](#)-collecting systems where the high stability and rigidity of diamondoid spacers mean a special advantage for the construction of well-defined complex molecular structures.

**More information:** Heinz Langhals et al. OrthoFRET in Diamantane FRET in Orthogonal Stiff Dyads; Diamond Restriction for Frozen Vibrations, *The Journal of Organic Chemistry* (2020). [DOI: 10.1021/acs.joc.0c01184](https://doi.org/10.1021/acs.joc.0c01184)

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