RECENT DEVELOPMENTS IN THE SEARCH FOR SEMICONDUCTOR CATALYSTS FOR NITROGEN FIXATION

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In the search for an efficient semiconductor catalyst for nitrogen reduction, several composite materials have shown encouraging results. The possibility of using photoinduced reduction of suitable redox species by irradiated titanium dioxide seems to be a promising pathway. If the reduced species is at a sufficiently negative electrode potential level, then chemical reduction of nitrogen via the reduced species is possible. This has been tried out with systems such as TiO_2/WO_3, TiO_2/CeO_2. Several other similar systems are under investigation. The process depends on the effective contact between TiO_2 and the substrate being reduced. These studies also point to alternative pathways for nitrogen reduction and may be valuable in understanding the mechanism of nitrogen fixation on irradiated semiconductor suspensions.

Evidence has also been established for a diazene-hydrazine type mechanism from studies of hydrogen evolution on several catalysts: bentonite/Fe_2O_3 and TiO_2/WO_3. The implications of this mechanism on the photoreduction of nitrogen to ammonia will be discussed.