

CLAIMS

1. A process for producing a photocatalyst that is capable of converting H₂S into hydrogen and sulfur comprising the steps of:

preparing a photocatalyst material; and

using an organic ligand to attach a transition metal species to a surface of the photocatalyst material without the formation of a dopant layer, wherein the organic ligand comprises 1,2-ethanedithiol (EDT).

2. The process of claim 1, wherein the photocatalyst material comprises CdS.

3. The process of claim 1, wherein the transition metal comprises Ni²⁺.

4. The process of claim 1, wherein the transition metal species comprises a late transition metal species.

5. A process for producing a photocatalyst that is capable of converting H₂S into hydrogen and sulfur comprising the steps of:

preparing a photocatalyst material comprising CdS; and

using an organic ligand to attach a transition metal species to a surface of the photocatalyst material without the formation of a dopant layer, wherein the step of using the organic ligand to attach the transition metal species comprises the steps of:

adding 1,2-ethanedithiol (EDT) to a first solution containing the CdS photocatalyst material to form a first mixture;

forming CdS precipitates from the first mixture;

redispersing the CdS precipitates in a second solution to form a suspension;

adding Ni(NO₃)₂ to the suspension; and

forming a CdS photocatalyst material that has Ni-EDT species attached to a surface thereof.

6. The process of claim 5 wherein the first and second solutions comprise ethanol.
7. A photocatalyst made in accordance with the process of claim 1.
8. A process for producing a photocatalyst that is capable of converting H_2S into hydrogen and sulfur comprising the steps of:
 - providing a photocatalyst material; and
 - decorating the surface of the photocatalyst with a transition metal species using an organic ligand without the formation of a dopant layer, wherein the organic ligand comprises 1,2-ethanedithiol (EDT) and wherein the step of decorating the surface comprises:
 - adding the organic ligand to a first solution containing the photocatalyst material to form a first mixture having precipitates;
 - washing the first mixture with ethanol;
 - redispersing the precipitates in a second solution to form a suspension;
 - adding the transition metal species to the suspension; and
 - washing the suspension with ethanol to form a photocatalyst material having a transition metal-organic ligand species attached to a surface thereof.
9. The process of claim 8, wherein the transition metal species comprises a late transition metal species.
10. The process of claim 8, wherein the photocatalyst material comprises CdS and the transition metal species comprises Ni^{2+} .
11. The process of claim 10, wherein the first and second solutions comprise ethanol.
12. The process of claim 10, wherein the transition metal-organic ligand species is a Ni-EDT species.
13. A photocatalyst made in accordance with the process of claim 8.