Co-deflagration synthesis of metallic, ceramic, and mixed ceramic-metallic particles (Ramot)

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A Novel Method for Preparation of Bi-metallic Catalyst

Bimetallic catalysts have been shown to outperform their monometallic counterparts in terms of both activity and selectivity.

There are now many examples of catalytic reactions (e.g CO oxidation, dehydrogenation, Fischer-Tropsch synthesis, Reforming) which are performed, on industrial scale, over bimetallic systems.

The method was demonstrated by the preparation of several bi-metallic particles:

- Iron on Lanthana
- Manganese on Ceria
- Palladium on Lanthana
- Nickel on Lanthana
  Proved to be a very effective catalyst for dry reforming of methane.

The new and general method for the preparation of bimetallic catalysts is based on co-deflagration of two metal complexes with nitrogen rich ligands.

The resulting catalyst comprises metal nano-particles impregnated or attached to particles of another metal or a metal oxide or its salt. The method allows for the preparation of broad variety of materials differing in structure, morphology and composition.

Co-deflagration process results in well mixed alloys and strongly bound particles of one phase dispersed throughout another phase. The particle size distribution and the surface area of particles resulting from co-deflagration process can be tuned by changing the chemical nature of the nitrogen rich ligand and by the addition of other gas generators to the deflagration mixture.

The advantages of the catalyst were demonstrated by preparation of a novel superior catalyst for dry reforming of methane. The novel approach to the design and preparation of the catalyst yielded a catalyst which comprises of nickel nano particles which decorate lanthana micro particles. This catalyst proves to be superior in catalytic activity and stability, as well as resistance against deactivation, to any other catalyst which has been reported so far.

Covered by several patent applications

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