

Cellular ceramic versus pellets as catalyst support for green propulsion applications

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Abstract

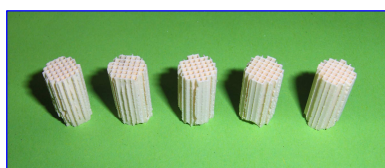
The catalysts developed about fifty years ago, for hydrazine or hydrogen peroxide decomposition, were generally prepared by using pellet substrates, in the shape of sphere or more irregular grains, made of porous transition alumina [1]. Since the development of car exhaust catalysts, the use of monoliths as catalyst supports has been developed to take the different advantages offered by the cellular ceramics by comparison with pellets into account [2, 3]:

- Lower pressure drop;
- Lower diffusion path inside the pores of the wash-coat layer;
- Better mechanical properties and resistance to thermal shock;
- No fine formation, no need of support plates;

Cellular ceramics can be therefore proposed as good substrate candidates to replace the gamma-alumina which has been traditionally used for pellets and needs generally a special preparation procedure. Cellular ceramics are today easily commercially available. CTI Company has prepared for this purpose samples that differ in nature, shape and channel density. To prepare the catalysts, the ceramics are first wash-coated e.g. a porous layer is deposited onto the internal surface. Then the active phase is impregnated inside the porosity of the wash-coat layer. The following parameters will be examined on the decomposition of hydrogen peroxide or energetic ionic liquids [4]:

- Nature of the cellular ceramic: cordierite, mullite or silicon carbide;
- Dimension, density and type of channels;
- Type of ceramic: honeycomb monolith or foam with more tortuous pathways.

This study is carried out in the field of the FP7-European project GRASP (Green Advanced Space Propulsion), website: <http://www.grasp-fp7.eu/grasp/>



Honeycomb type monoliths



block of foam



cylindrical-shaped foam.

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