

## Parallel Technology

To achieve significant developments or improvements in catalytic processes within the chemical industry often means the preparation of a large number of chemical compounds and screening of these samples for performance under a range of test conditions in order to effectively test out novel ideas.

Use of conventional research approaches provides a significant bottleneck in how many such new ideas can be evaluated, severely limiting the rate of innovation.

Parallel technology which is the basis of Combinatorial / High throughput approaches, in which large libraries of compounds can be prepared in arrays and these arrays of samples can be tested in parallel under automated control, allows significant reduction in the cost and cycle time for evaluating new ideas. This increases the opportunity of improvement or optimisation of products and chemical processes.

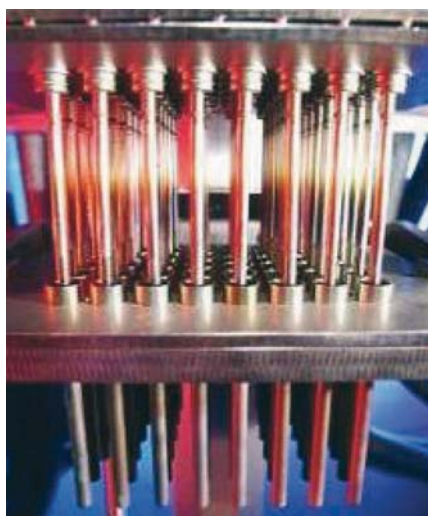


Figure 1. Miniaturised catalytic reactor system for testing 48 samples in parallel.

## Expertise

SINTEF's Combinatorial / High Throughput Chemistry environment has an established track record within the development and application of Parallel Approaches to accelerating the research and development process.



Figure 2 Array of samples ready for parallel testing under high temperature reaction conditions.

A range of advanced parallel systems have been developed for and with customers, these being applied to a range of applications, including the preparation, characterization and testing of catalysts and adsorbent materials.

Combinatorial / High Throughput technology is ideal for use in collaborative research programs. SINTEF's broad multi-disciplinary applied research environment allows this technology to be extended to new fields where screening of hundreds of samples in parallel can cut costs and extend the range of systems investigated.

## Applications

Parallel technology can be a generic approach that can be applied to a wide range of fields in which materials or chemical compounds are to be prepared or modified and their properties/performance evaluated to find the most promising candidate.

Fields currently developed or under development are:

### Catalyst Development

- Synthesis
- Testing
- Characterisation

### Materials preparation and characterisation

#### ■ Materials

- Ceramics
- Oxides
- Porous materials
- Electronic materials
- Metallorganics
- Adsorbents

#### ■ Preparation Techniques

- Hydrothermal (260 °C, agitated)
- Impregnation
- Incipient wetness
- Ionic exchange
- Co-precipitation
- Sol gel
- Formulation, Grinding and sizing
- Thermal aging / Calcination
- Hydration / Rehydration
- Novel protocols

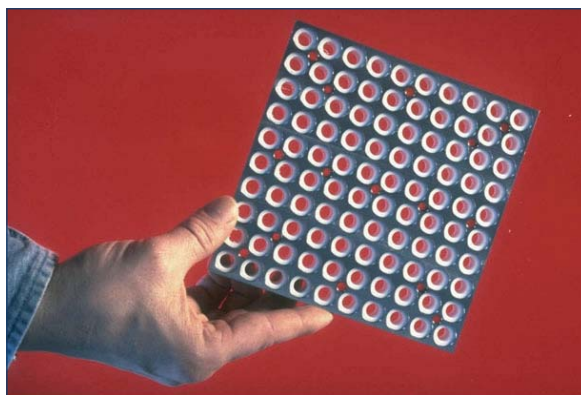


Figure 3. System for miniaturised parallel synthesis of catalyst materials under high temperatures and pressures.

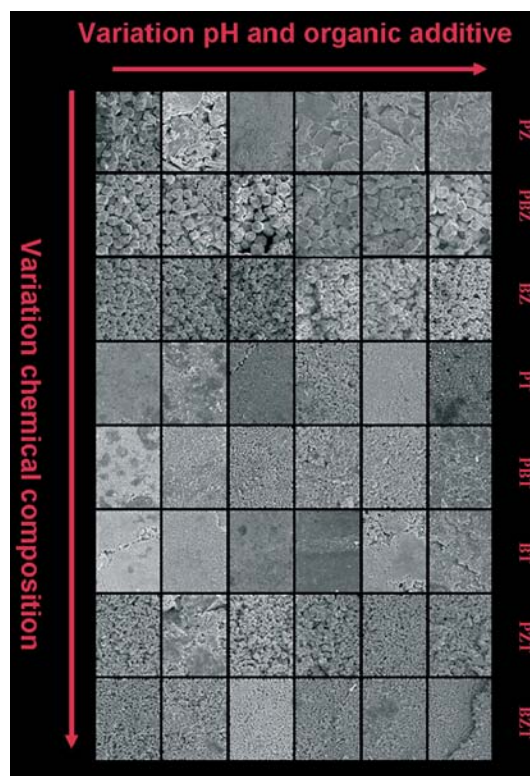


Figure 4. Scanning Electron Micrographs of 48 different materials prepared in parallel under hydrothermal conditions.



SINTEF Materials and Chemistry

### Hydrocarbon Process Chemistry

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