

多目的エネルギー高効率生成・輸送・回収システムの開発

Development of Various Systems Relevant to High-Performance Energy Production, Transport and Collection

キーワード：ナノ粒子、バイオマス、水素 / keywords: nanoparticle, biomass, Hydrogen

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●亜音速領域水素噴流拡散火炎に関する研究

亜音速水素噴流燃焼現象を明らかにし、次世代クリーン燃焼用バーナーなどの燃焼器設計の基礎データの構築を図る。

●バイオマスからの生成熱及び希少物質抽出に関する研究

バイオマスの最適燃焼特性を把握する事で、燃焼器や燃焼生成物（リン化合物）回収器への応用を目指す。（特願 2005-199908、国際特許：PCT/JP2006/313678）

●熱衝撃波の伝播特性に関する研究

ナノ・マイクロ構造体内部で生じる熱衝撃波の発生とその機構を明らかにし、超微細構造ものづくりの進展を図る。

●ナノ流体による高効率熱輸送に関する研究

ナノダイヤモンド流体による高効率・高熱輸送特性の解明と電子デバイス冷却への応用を目指す。（特開2006-11638）

●バイオマスの高カロリー燃料化に関する研究

バイオマスを用いた高カロリー燃料化（5000kca/kg程度）を図り、化石燃料の代替燃料を目指す。（特願2007-144752）

Subsonic Hydrogen Jet Diffusion Flame: The present study is to disclose the underlying combustion characteristics of subsonic hydrogen jet diffusion flames using a micro-size nozzle.

Rare-material Correction and Thermal Production from Biomass : Based on combustion of free jets formed in stagnant air, in which a mixture of the waste liquid and waste oil is injected, rare-material correction and thermal production are studied.

Thermal Shock Wave Propagation: The present study deals with the effect of laser radiation on the propagation phenomenon of a thermal wave in a very thin film subjected to a symmetrical heating on both sides.

Thermal Fluid Transport of Nanofluid: The study is to disclose the convective heat transfer behaviour of aqueous suspensions of nano-diamond particles flowing through a horizontal tube heated under constant heat flux condition.

High-Calorie Fuel Based on Biomass: The study is to produce high-calorie fuel based on biomass, whose thermal rate is equal to that of fossil fuel.



Figure 1
Subsonic Flame



Figure 2
Biomass Combustion

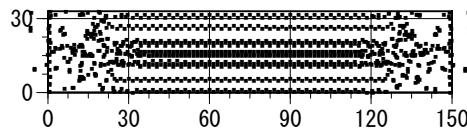


Figure 3
Thermal Wave

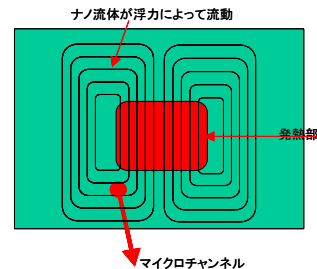


Figure 4
Nano Fluid Device



Figure 5
Biomass Fuel

Development of Various Systems Relevant to High-Performance Energy-Production, -Transport and -Collection

Key Words : Nanoparticel, Biomass, Hydrogen , Heat Exchanger, Micropump, Thermal Shock Wave, Combustion, Flow Control

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● Study on Subsonic Hydrogen Jet Diffusion Flame (Fig.1)

The aim is to develop the new device by studying split flame and reignition phenomenon of subsonic jet diffusion flames.

● Production of Renewable Energy using Biomass (Fig.2)

The aim is to produce the thermal energy by a free jet formed in stagnant air, in which a mixture of waste liquid and waste oil is injected in the horizontal direction. (Patent 2005-199908、International Patent : PCT/JP2006/313678)

● Study on Thermal Propagation in Nano-Materials (Fig.3)

The aim is to study the thermal propagation in a very thin film subjected to a symmetrical temperature change on both sides by means of molecular dynamics method.

● Thermal Fluid Flow Phenomenon in Nanofluid (Fig.4)

The aim is to develop the thermal device based on the convective heat transfer behavior of aqueous suspensions of nano-diamond particles. (Patent 2006-11638)

● Development of Renewable Energy Based on Biomass (Fig.5)

The aim is to develop the renewable fuel based on biomass, whose calorie is similar to the fossil fuel. (Patent 2007-144752)

● Development of High Performance Plate Heat Exchanger (Fig.6)

The aim is to develop the high performance plate-type heat exchanger in which the titanium material is employed.

● Study of thermal and Flow control in Closed Cavity (Fig.7)

The aim is to control the thermal fluid flow in the closed or opened indoor for saving the energy.

● Development of Micro-pump in Body (Fig.8)

The aim is to develop the micro-pump which is buried in the body.

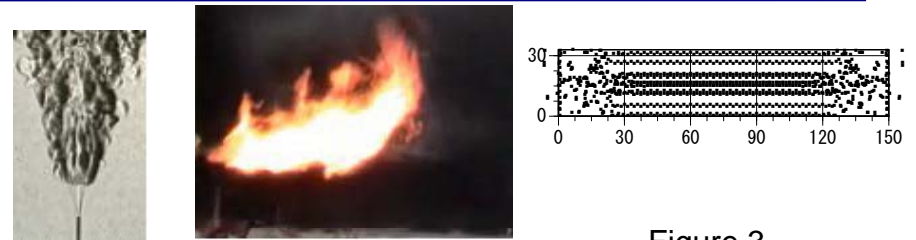


Figure 1 Subsonic Flame Figure 2 Biomass Combustion

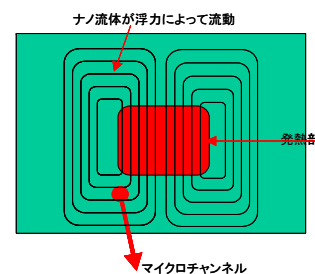


Figure 4 Nano Fluid Device



Figure 5 Biomass Fuel



Figure 3 Thermal Wave

Figure 6 Plate Heat-Exchanger

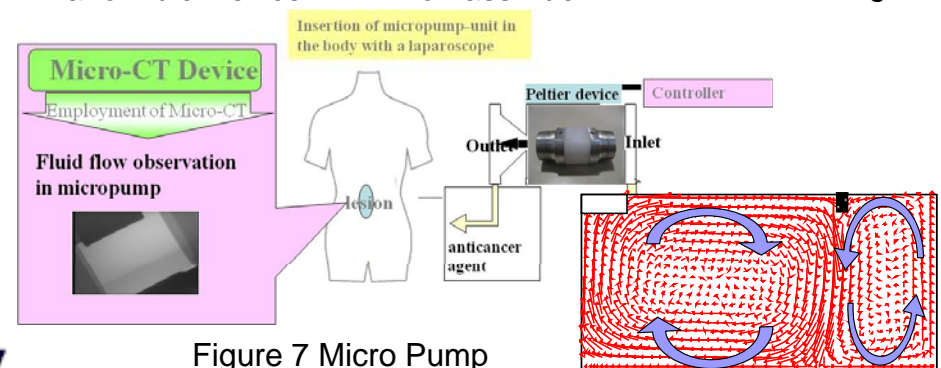


Figure 7 Micro Pump

Figure 8 Thermal-Flow Control