

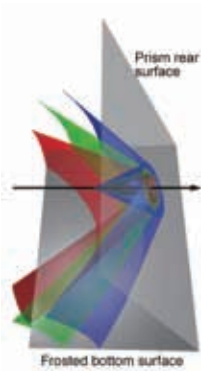
Direct, Absolute, and In Situ Measurement of Fast Electron Transport via Cherenkov Emission

Habara, H.; Ohta, K.; Tanaka, K.A.; Kumar, G.R.; Krishnamurthy, M.; Kahaly, S.; Mondal, S.; Bhuyan, M.K.; Rajeev, R.; Zheng, J. (Graduate School of Engineering)

Physical Review Letters, 104, 055001 (2010)

▲Reprinted from Physical Review Letters, 104, 2010, 055001, Direct, Absolute, and In Situ Measurement of Fast Electron Transport via Cherenkov Emission, Habara, T. et al., with permission from The American Physical Society.

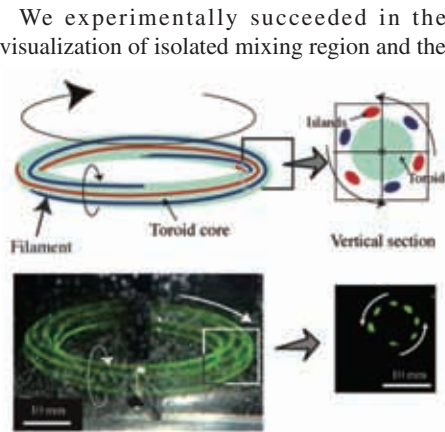
We present direct measurements of absolute energy distribution of relativistic electrons generated in intense, femtosecond laser interaction with a solid. Cherenkov emission radiated by these electrons in a novel prism target is spectrally dispersed to obtain yield and energy distribution of electrons simultaneously. A crucial advance is the observation of high density electron current as predicted by particle simulations and its transport as it happens inside the target. In addition, the strong sheath potential present at the rear side of the target is inferred from a comparison of the electron spectra derived from Cherenkov light observation with that from a magnet spectrometer.



Experimental Study on Geometric Structure of Isolated Mixing Region in Impeller Agitated Vessel

Hashimoto, S.; Ito, H.; Inoue, Y. (Graduate School of Engineering Science)

Chemical Engineering Science, 64, 5173-5181 (2009)



We experimentally succeeded in the visualization of isolated mixing region and the analysis of its structural property in agitated vessel with rotated two-bladed paddle impeller. A set of thin filaments spirally wrapping around the core of the toroidal isolated mixing region was observed under low Reynolds number conditions. It was revealed that the three-dimensional geometrical structure of filament in isolated mixing region depended on the periodical perturbations caused by the rotating impeller and was predictable based on relation between the movement of fluid particle and filament numbers and/or wire turns. Surprisingly, the wire turns of filaments were opposite to movements of fluid particles.

Fault-prone module detection using large-scale text features based on spam filtering

Hata, H.; Mizuno, O.; Kikuno, T. (Graduate School of Information Science and Technology)

Empirical Software Engineering, 15(2), 147-165 (2010)

▲With kind permission from Springer Science+Business Media: < Empirical Software Engineering, Fault-Prone Module Detection Using Large-Scale Text Features Based on Spam Filtering, 15(2), 2010, 147-165, Hata, H. et al., Table 7, and any original(first) copyright notice displayed with material>.

This paper proposes an approach using large-scale text features for fault-prone software module detection inspired by spam filtering. The number of every text feature in the source code of a module is counted and used as data for training detection models. By using text features, we can identify which terms in source code modules affect on the existence of faults. To show the effectiveness of our approaches, we conducted experiments with five open source projects and compared them with a well-known metrics set, thereby achieving higher detection results. The results imply that large-scale text features are useful

in constructing practical detection models, and measuring sophisticated metrics is not always necessary for detecting fault-prone modules.

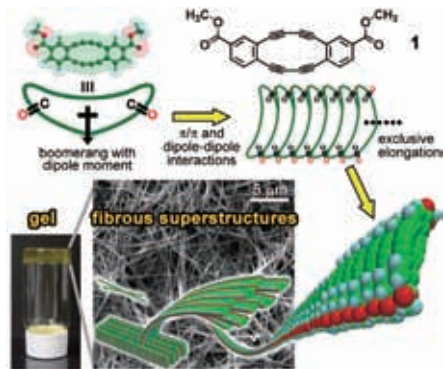
Table 7 Top three text features ordered by positive and negative regression coefficient values of logistic regression models

Project	Positive regression coefficient Feature	Value	Negative regression coefficient Feature	Value
DIRT	power	79.2	cast	-665.1
	getObjec	73.9	en	-180.0
	package	71.8	Member	-148.7
ECLP	Navigation Plug	51.6	PerformanceToolSep	-32.9
	SourceCodeConfiguration	14.3	AbstractTTPugin	-18.0
	idBaseType	13.0	removeSelectionChangedListener	-16.8
MODH	org.omg	13.7	getURL	-12.0
	gl	4.5	getFactory	-8.7
	Factory	3.9	v	-5.3
TPFP	LF	25.6	ats	-153.6
	setTestInvocation	52.3	immune	-43.0
	createPatternResourceURL	49.6	DIR_STATUS	-70.3
WTF	Mining	10.0	AlarmCreation	-31.8
	extra	8.5	FieldAccess	-31.8
	COMPILE_UNIT	8.7	SimpleName	-31.8

Octadecyhydrodibenzo[12]annulene-Based Organogels: Two Methyl Ester Groups Prevent Crystallization and Promote Gelation

Hisaki, I.; Shigemitsu, H.; Sakamoto, Y.; Hasegawa, Y.; Okajima, Y.; Nakano, K.; Tohnai, N.; Miyata, M. (Graduate School of Engineering)

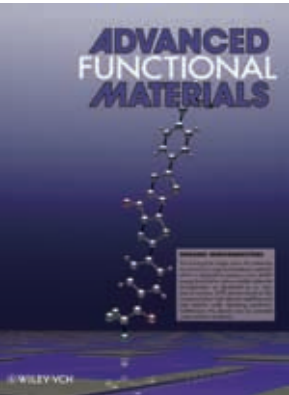
Angewandte Chemie International Edition, 48, 5465-5469 (2009)



This paper described the unusual formation and characterization of organogels

provided by a boomerang-shaped octadecyhydrodibenzo[12]annulene derivative 1. Despite a lack of long alkyl chains but rather equipped with only two methyl ester groups, compound 1 constructed fibrous superstructures and acted as an excellent low molecular weight organic gelator for various organic solvents such as 1,2-dichloroethane. To the best of our knowledge, there have been no examples of such the low molecular weight organic gelator. The present results probably cased from one-dimensional aggregation anisotropically-accelerated by desymmetrized molecule shape and effective π/π and dipole-dipole interactions.

An electronegative conjugated compound composed of a newly designed carbonyl-bridged bithiazole unit and trifluoroacetyl terminal groups is developed to induce suitable molecular arrangements for organic field-effect transistors (OFETs). Cyclic voltammetry measurements reveal that carbonylbridging contributes both to lowering the energy level of the lowest unoccupied molecular orbital and to stabilizing the anionic species. X-ray crystallographic analysis of the compound shows a planar molecular geometry and a dense molecular packing. Through these appropriate electrochemical properties and structures for n-type semiconductor materials, OFET devices based on this compound show high electron mobilities and high stability under operating conditions. Furthermore, the devices can be operated under ambient conditions.



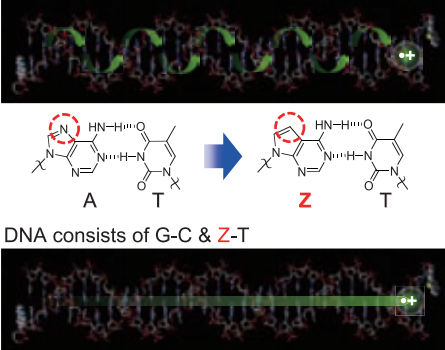
▲From Advanced Functional Materials, 20, Aso, Y. et al., Air-Stable n-Type Organic Field-Effect Transistors Based on Carbonyl-Bridged Bithiazole Derivatives, 907-913, 2010. Copyright Wiley-VCH Verlag GmbH & Co. KGaA. Reproduced with permission.

Air-Stable n-Type Organic Field-Effect Transistors Based on Carbonyl-Bridged Bithiazole Derivatives

Ie, Y.*¹; Nitani, M.; Karakawa, M.*¹; Tada, H.*²; Aso, Y.*¹
^{*1}(The Institute of Scientific and Industrial Research)
^{*2}(Graduate School of Engineering Science)

Advanced Functional Materials, 20, 907-913 (2010).

DNA consists of G-C & A-T



DNA consists of G-C & Z-T

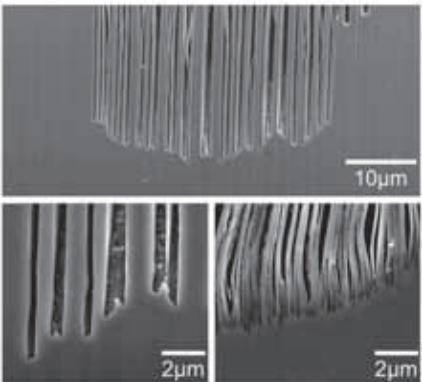
Since a positive charge migrates along DNA through the HOMO of G-C, the conductivity of DNA strongly decreases with the increasing A-T content hampering the construction of nano-electric sensors and devices in which the use of various sequence patterns are indispensable. In this paper, we demonstrated that the charge-transfer efficiency can be drastically increased in a G-C content independent manner by adjusting the HOMO-level of the A-T base-pair closer to that of the G-C base-pair by substituting the N7 nitrogen of A with a C-H group (deazaadenine: Z) while properly maintaining the sequence information carried by DNA.

Sequence-Independent and Rapid Long-Range Charge Transfer through DNA

Kawai, K.; Kodera, H.; Osakada, Y.; Majima, T. (The Institute of Scientific and Industrial Research)

Nature Chemistry, 1, 156-159 (2009)

Selective dissolution of multiphase alloys is of great importance not only from the point of view of durability under corrosive environment but also for opening up a new area of metal forming technology in nanometer scale. In this study, electrochemical dissolution of a Ti-Al alloy consisting of unidirectional-laminate of TiAl and Ti₃Al in a NaCl aqueous solution has been investigated focusing on the effect of lamellar thickness in the range of 20 nm~1 μ m. The widths of crevasses formed by the dissolution of TiAl-layer were tuned by controlling the heat treatment condition for the lamellae formation. Their depth exceeded 100 μ m and became uniform with decreasing lamellar thickness.



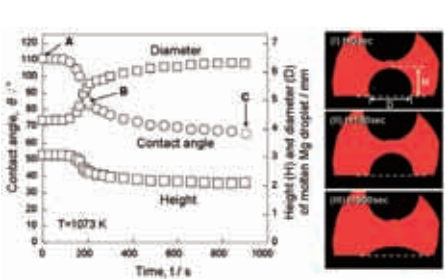
Selective Dissolution of Nanolamellar Ti-41 at.% Al Alloy Single Crystals

Koizumi Y.; Sugihara, A.; Tsuchiya, H.; Minamino Y.; Fujimoto, S.; Yasuda H.; Yoshiya, M. (Graduate School of Engineering)

Acta Materialia, 58, 2876-2886 (2010)

Wetting behavior of molten pure Mg droplets on pure Ti substrate, a crucial phenomenon in the design of Mg matrix composites reinforced with Ti particles, was investigated by the sessile drop method. The effects of two parameters on contact angle in wetting were evaluated: Mg evaporation during wetting test; and surface oxide film of the substrate. At the initial wetting stage, a large contact angle with 95-110 degree was obtained, which depended on reduction of titanium oxide surface films by Mg droplets. When the molten Mg contacts an area of pure Ti after reduction, the contact angle

suddenly decreased. The equilibrium value at stable state strongly depended on the surface roughness of Ti plate.



Wettability of pure Ti by molten pure Mg droplets

Kondoh, K.; Kawakami, M.; Imai, H.; Umeda, J.; Fujii, H. (Joining and Welding Research Institute)

Acta Materialia, 58, 606-614 (2010)

▲Reprinted from Acta Materialia, 58, Kondoh, K. et al., Wettability of pure Ti by molten pure Mg droplets, 606-614, Copyright 2010, with permission from Elsevier.