TOSHIBA REVIEW

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Special Reports

Basic Technologies of ecostyle$_{TM}$ Products

Technologies for Effortlessly Creating Comfortable and Eco-Friendly Lifestyles
OKAZAKI Shizuo

ecostyle$_{TM}$ Products Aiming at Global Warming Prevention and Comfortable Life
YAMADA Tetsuro
Toshiba introduced ecostyle$_{TM}$ as a new marketing concept covering our home appliances in October 2007. Based on this key concept, we have been providing customers with choices for new ecological lifestyles without lowering comfort levels and without the need for too much effort. We are continuing to make technical innovations for the development of ecostyle$_{TM}$ products with higher performance, in order to further contribute to the prevention of global warming.

Energy Conservation Technology Applying Home Network System
HIRAHARA Morio / SAWAI Hiroshi / KUWABARA Katsuyoshi/ TAKAHASHI Toshiaki
Toshiba's FEMINITY$_{TM}$ home information technology (IT) system is steadily becoming popularized due to the widespread diffusion of the Internet and cellular phones and the service applications of the system responding to diverse market demands. There has also been growing emphasis on energy conservation, including in consumer markets, since the Third Conference of the Parties to the U.N. Framework Convention on Climate Change(COP3) in 1997.
We have developed a new FEMINITY$_{TM}$ service, electric power monitoring, applying home network technology. This new service promotes energy saving at home by visualizing electricity consumption while controlling networked home appliances.

Energy-Saving Technologies for Air Conditioners Offering Comfortable Living Environment
SEKI Yusuke / ODASHIMA Madoka / HIRANO Koji
Toshiba Carrier Corporation has been developing air conditioners that offer comfort and economy while contributing to preservation of the global environment by improving the annual performance factor (APF) of the cooling capacity for the 4.0 kW-class model, which has become a leading product for living rooms.
The 4.0 kW cooling capacity model won the 2007 Energy Conservation Grand Prize, and has attained the highest energy-saving performance due to the development of a new compressor, inverter system, and high-performance air-purification unit with low air resistance.

Energy-Saving Technologies for TW-4000VF Drum Type Washer-Dryer with Heat Pump
NISHIWAKI Satoru / KONO Tetsuyuki
Sales of washer-dryers in Japan are expected to reach about 1.3 million units in fiscal year 2008, accounting for about 30% of all washing machine sales, with those of drum type washer-dryers amounting to 0.8 million units. In response to the worldwide demand for the reduction of carbon dioxide (CO_2) emissions, Toshiba Home Appliances Corporation has been developing products that reduce both water and power consumption by introducing a high-capacity drum type structure and a refrigeration cycle using a heat pump system.
We have now released the TW-4000VF, a new drum type washer-dryer equipped with a heat pump system as well as a new compact compressor and new refrigeration cycle control system. As a result of these technologies, the TW-4000VF features high energy-saving performance and high washing and drying performance.

GR-X56FT Energy-Saving " Reach-In" Refrigerator
MASHIMO Takuya / MISHIMA Koji / NOGUCHI Akihiro
In home appliance products, especially in refrigerator it is not only required to reduce power consumption but also to reduce food wastage in accordance with the spirit of mottainai (the philosophy of utilizing things fully and avoiding waste).
Toshiba Home Appliances Corporation has developed the GR-X56FT refrigerator to meet the above requirements. This model is equipped with a new style" visible at a glance vegetable compartment" to improve the visibility and accessibility of its contents, in order to reduce food wastage. The GR-X56FT refrigerator has two other feature; (1) a high humidity of about 85%, achieved by adopting a dual twin-cooling system and ducting designed by computational fluid dynamics; (2) improvement of energy saving, achieved by reduction of insulating partitions separating the vegetable compartment and freezer, reduction of heaters, and higher cooling efficiency. These features promote good eating habits and reduce power consumption by 24 %.

High-Efficiency White LED Lamps to Replace Incandescent Lamps
TANAKA Toshiya / OSAWA Shigeru
Eco-friendly self-ballasted fluorescent lamps and light-emitting diode（LED） lamps are being developed with the aim of reducing carbon dioxide（CO_2） emissions. In particular, white LED lamps are expected to be the next-generation light source. The efficiency of white LED lamps is now approaching that of fluorescent lamps, and there is worldwide demand for high-efficiency white LED lamps with E-type screw bases to replace existing incandescent lamps.
Toshiba Lighting & Technology Corporation（TLT） has developed white LED lamps with E-type screw bases that can replace general-purpose incandescent lamps. After 20,000 hours of operation, these white LED lamps show a significant reduction in electricity cost and CO_2 emissions in comparison with incandescent lamps.

Energy-Saving High-Efficiency LED Luminaires for Residential Lighting Applications Utilizing E-CORE$_{TM}$ Technologies
HAYASHI Junya / SHINOZAKI Akihito
High-efficiency light-emitting diodes (LEDs) are expected to be the next-generation light source for residential lighting applications, which are expanding to various areas including downlights. The efficiency of LEDs has been improving year by year, and they are becoming popular not only as local lighting sources but also for general lighting. Especially for outdoor lighting applications, there are expectations for the development of products offering a long life and power-saving operation, which are features of LEDs.
Toshiba Lighting & Technology Corporation has developed outdoor LED modules and outdoor lighting fixtures for residential lighting applications utilizing the technologies of the already released E-CORE$_{TM}$ LED downlights.

Long-Life Mercury-Free HID Lamp for Automotive Headlamps
DEGUCHI Makoto / OKI Masahiro / NOGUCHI Hidehiko
In recent years, high-intensity discharge (HID) lamps have come into widespread use for automotive headlamps due to their superior luminous flux compared with halogen lamps. Conventional HID lamps contained mercury, an environmentally harmful substance, and their replacement with mercury-free HID lamps began in 2004. However, there was a problem that the lifetime of the mercury-free HID lamps was shorter than that of conventional HID lamps.
To overcome this problem, Harison Toshiba Lighting Corporation has developed a long-life mercury-free HID lamp with characteristics comparable to those of the previous mercury-free HID lamps, and started to produce it in commercial quantities in March 2008.

Feature Articles

Analysis of Word-of-Mouth Information from Consumer-Generated Media on Internet
NAGANO Shinichi / MIZOGUCHI Yumiko / INABA Masumi
Active utilization of word-of-mouth information appearing on the Internet has been increasingly employed as a business approach in recent years.
Toshiba has developed a word-of-mouth analysis engine for analyzing information from consumer-generated media (CGM) on the Internet. The main feature of this technology is its application of ontology to a text analysis procedure in addition to conventional natural language processing.
This makes it possible to extract evaluation expressions related to consumer products from blog articles with high accuracy. In the process of applying the engine to our business activities, we have also developed support tools for ontology development and analysis tools for market research.

SiC-MOSFET with High Channel Mobility and High Reliability
SUZUKI Takuma / HATAKEYAMA Tetsuo / SHINOHE Takashi
Silicon carbide (SiC) is considered to be the next-generation material for power switching devices because of its potentially low-loss switching and high blocking voltage performance. The achievement of a high-channel-mobility SiC metal-oxide semiconductor field-effect transistor (SiC-MOSFET)is imperative to realize an ultra-low-loss SiC-MOSFET that exceeds the silicon limit. On the other hand, SiC gate oxide reliability has been considered to be insufficient because the gate oxide layer contains carbon.
Toshiba has developed the" dry oxidation + pyrogenic reoxidation" gate oxidation method in order to attain both high channel mobility and high reliability. Using this method, we have achieved both the world's top level of channel mobility (93 cm^2/Vs) and high reliability (charge to breakdown:17.5 C/cm^2).

Customer Trajectory Detection System Using Multiple Omnidirectional Cameras
KUBOTA Susumu / MARUYAMA Masayuki / IKUMI Tomonori / TAKAHATA Masami
Demand is increasing for a system that is capable of recognizing customer behavior in retail stores. However, customers are often occluded by other customers in crowded situations, which causes difficulties in detecting and tracking people in a sequence of images.
Toshiba and Toshiba TEC Corporation have developed a customer trajectory detection system using multiple omnidirectional cameras. A group of omnidirectional cameras are located so that each area is observed from three different viewpoints in order to alleviate the occlusion problem.
The system uses background subtraction, voxel carving, and pattern recognition to achieve stable results.

Business Communication System Strata$_{TM}$ CIX series
YOSHIDA Shinichi / NIIYA Norimasa / HORIUCHI Takeshi
With the recent progress in broadband systems and Internet Protocol (IP)-based networks, broadband communication services in which voice, video, and data are integrated by an IP-based network are becoming essential in the business communication market. The demand for telecommuting and mobile offices using IP networks is also increasing, heralding the arrival of the ubiquitous society without the need to be aware of actual physical location.
In response to these circumstances, Toshiba has developed business communication system Strata$_{TM}$ CIX series. This system provides various solutions like IP enterprise, visual communication and teleworker. And also as the user interface, IP multi-function telephones are developed to meet the requirements from various user's circumstances.

Multiband Distributed Antenna System for Indoor Coverage of Base Transceiver Stations
HONDA Naohiro / NAKAO Toru / YAMASAKI Yutaka
As mobile phones have become an indispensable part of daily life, used anywhere and anytime, mobile phone operators are expanding service areas to both indoors and outdoors for various applications such as voice and data communications, electronic payments, and so on.
Toshiba has been supplying a variety of indoor coverage systems that distribute mobile phone signals in high-rise buildings, exhibition halls, and other locations that are difficult for signals from base transceiver stations to reach. We have now developed a multiband distributed antenna system that is capable of significantly enlarging communication capacity and expanding indoor service areas, while at the same time supporting remote network management.

Metal Halide Lamps with Transparent High-UV-Blocking Film to Reduce Insect Attraction
KAWAKATSU Akira / OKAMURA Kazuyoshi
Metal halide lamps with a transparent ultraviolet (UV)-blocking film to reduce the attraction of insects, material fading, and discoloration are generally available on the market. However, the conventional zinc oxide (ZnO) films are insufficient to prevent insect attraction.
Toshiba Lighting & Technology Corporation (TLT) has developed a new transparent film with high UV-blocking capability that contains indium (In)-doped ZnO, as well as the coating technology for this film. The new film has a longer cutoff wavelength of about 400 nm compared with conventional ZnO films (about 380 nm), blocking 99 % of rays in the ultraviolet A (315-400 nm) range. As a result, metal halide lamps coated with this film reduce insect attraction by almost 25 % compared with our conventional high-pressure mercury lamps.

Frontiers of Research & Development

Embeddable Lightweight XML Database
Metal Gate and High-κ Dielectric Technology for Next-Generation Logic LSI