Innovative Intensive Care Unit Family Service System - Take National Cheng Kung University Hospital as an Example

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In this year's project, the information retrieve kiosk – ICUinfo has been approved by NCKU Hospital for implementation in ICU family rest area since July, 2009. After some usage evaluation, we found out that patients' families inclined to use “Religious and Spiritual Support” than other information pages, which illustrates that self-service is more suitable for patients' families' assurance need in this occasion, while as for information needs, they would like to ask medical personnel for immediate information feedback and uncertainty reduction.

Another output of this project, FamilyAID has completed the patent application. (patent name: Multi-Functional Furniture For Sitting And Lying, Taiwan invention patent, patent code: 098135529, application date: 2009.10.21) Currently, a 3D model was built for clear illustration and a tangible prototype is under construction. It is expected to be completed in early April this year, and then being placed in ICU family rest area of NCKU Hospital for experience test.

Although in this project, the focal point only emphasized on caring ICU patients' families, the notion of virtual pray room in ICUinfo can be expanded to other occasions, where people also need religion supports. An innovative furniture idea with a similar usage way of FamilyAID is designed for extensively promoting virtual religion. This innovative furniture is called “伴家俱”, which means rest seat (or related furniture) with a technology-based information device attached to it. Users can comfortably sit or lie on it and utilize the information devices to access virtual pray room. The development of “伴家俱” will be the next object of our plan, wishing to bring convenient information technology into every corner of our life.
Study on Historical Transition in East Asia: Gender, Body and Multiculture

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A "Integration Research on East Asia History Development" has been set as a devoted research direction for the History Department of National Cheng Kung University (NCKU) since 2006. We meant to set a core-topic for all the research teams which major in different fields, in attempt to broaden our visions and to integrate all the resources devoted to this study. Besides, it is hoped that directed by this project, the research team could exchange points of views with scholars from different institutions through holding international symposiums, or conferences.

The research team devoted to turn the NCKU History Department into an important research center and a platform for research exchanging of East Asia History Development, thus consolidate our international academic status in this field. The NCKU History Department has begun the process by:

1) Constantly holding biennial international symposiums on East Asia History Development thus make NCKU History Department a regular research base on this topic. The second international symposium “The Spreading and Conflict of Different Religions: A Symposium on Historical Development in East Asia (Ⅱ)” which was held in November 2009 had invited foreign scholars from Hong Kong, China, Japan, Korea, Vietnam, Malaysia.

2) Holding annual scholar workshop and doctoral student workshop on each year's topic. The scholar workshop invites scholars at home and abroad to give lectures and lead discussions on the yearly topic. The doctoral student workshop invites doctoral students at home and abord to submit papers on the yearly topics. After carefully evaluation, the presentation can make a high-quality academic forum. In December 2009, we held "Gender, Body and Multiculture" scholar workshop in which invited Professor Jen-Der Lee (Institute of History and Philology, SINICA), Professor Yu-Chen Lee (Department of Chinese Literature, NTHU) and Professor Fang-Chi Yang (Department of Taiwanese Literature, NCKU) to give speeches.

3) To build an academic website of East Asia History Development. Thus, NCKU History Department research team can make scholars in the same field who are from Taiwan, China, and other North-East and South-East Asia countries to cohere successfully.

4) The research team members submit articles on the yearly topic every year, set to understand the history of East Asia ethnic cultures, of how they exchange, alter and develop. This year (2009), the topic is "Gender, Body and Multiculture." While looking back, the research team can also re-evaluate East Asia Civilization in the 21st century, at the same time; the East Asia History can be given a new reinterpretation. The research team members presented twelve articles in "Historical Development in East Asia--The Spreading and Conflict of Different Religions: Research result presentation from August 2008 to July 2009" which held in September 2009. These drafts of research articles will also be published in academic journals after being revised.

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Lung cancer is a leading cause of death in Taiwan. There is multilevel cross-stimulation among targets along several signaling pathways that lead to tumor growth. Blocking only one of these pathways allows other pathways to act as salvage or escape mechanisms for cancer cells. Therefore, a logical approach would combine chemotherapeutic agents that can inhibit drug resistance and/or survival signals to improve treatment efficacy in lung cancer. We have shown that lung cancer cells with constitutive tyrosine phosphorylation of Stat3 are more resistant to paclitaxel-induced apoptosis, so we plan to knockdown Stat3 by siRNAs. Combined with anti-cancer agents, we can make the cancer treatment more efficiently.

Incorporating siRNA in nanoparticles (NPs) is a promising approach for their systemic delivery to perform gene therapy because their size prevents siRNA excretion from the kidney. Recently, the FDA approved poly (D, L-lactide-co-glycolide) (PLGA) for clinical use in humans. NPs retained intracellularly could release the encapsulated drug slowly, leading to a sustained drug effect, which is especially crucial for drugs that require intracellular uptake. Therefore, PLGA NPs containing chemotherapeutics are more cytotoxic to cancer cells than chemotherapeutics alone. PLGA carrying siRNA is proved to be an effective method to perform gene therapy.

We can synthesize PLGA nanoparticle. In this project, we firstly demonstrated that PLGA nanoparticles carrying Stat3 siRNA and paclitaxel to make lung cancer treatment in one bullet. Then the nanoparticles will reduce chemoresistance of paclitaxel and then kill cancer cells more efficiently. In chemoresentant T12 lung cancer cell line (the cells were grown in the medium containing 12nM of paclitaxel), PLGA nanoparticle co-delivering paclitaxel and FITC can effectively be uptaken by T12 cells, and destroy tubulin in T12 cells. Next, after adsorption of Stat3 siRNAs onto PLGA NPs enclosing paclitaxel, the PLGA bullet can knockdown Stat3 protein expression and kill the cancer cells more efficiently.
Accomplishments which are leading the discipline in the world, Asia or Taiwan:

- We have firstly succeeded in synthesis of (PLGA bullet)- PLGA nanoparticle co-delivering paclitaxel and FITC.

Explanation:
PLGA bullet can effectively be uptaken by T12 cells and enter the cytosol (illustrated by FITC fluorescence), and FITC bullet made tubulin damage (red fluorescence) and made T12 cells become smaller. (Blue stain: DAPI)

Accomplishments which are leading the discipline in the world, Asia or Taiwan:

- We have firstly succeeded in synthesis of PLGA nanoparticle co-delivering paclitaxel and Stat3 siRNA simultaneously (PLGA bullet).

Explanation:
In chemoresistant cell line T12 cells, which grew in the medium contained with 12 nM paclitaxel, PLGA bullet can effectively kill T12 cells.
Nano-Fabrication Based on Metal Direct Contact Transfer with Applications on New Opto-electronic Devices

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We have been developing a series of nano-imprinting and contact printing technologies for fabricating structures in the sub-micrometer or nanometer scale. The goal is to remove the various limitations imposed by conventional photolithography and/or e-beam lithography on micro/nano-fabrication and accomplish large area and low cost fabrication of micro/nano-scaled structures. Particular emphasis is given on developing new types of opto-electronic devices.

An infrared assisted roller imprinting method was developed as shown in Fig. 1 (a). On the surface of a silicon mold with some micro/nano-features, an anti-adhesion layer and a metal layer are subsequently deposited. With the IR heating and roller pressing, the micro/nano-scaled metallic patterns are directly transferred and embedded into the PET substrate, and therefore complete the fabrication process. A flexible polarizer is then formed as shown in Fig. 1(b). The smallest line-width successfully patterned is 60 nm as shown in Fig. 1(c), and the largest patterned area size is 4 x 4 cm². With further improvement in system setup and mold fabrication, smaller patterned line-width and larger patterned area are expected in the near future.
Another nano-fabrication technology developed in our group is contact-transfer and mask embedded lithography (CMEL). The CMEL is a metal contact printing method which, when applied to a double polymer layers structure, can easily fabricated large-area polymer structures in sub-micrometer and nanometer scale. As shown in Fig. 2(a) is a polyimide (PI) structure fabricated by CMEL and the PI structure preserves all its original physical and material properties. Based on this patterned PI structures and cooperated with Prof. W. Y. Chou’s group (Inst. Electro-Optical Sci. & Eng., NCKU), a new type of pentacene-based organic thin film transistor with unique and outstanding electronic properties is successfully developed.
Fig. 2. Contact Transfer and Mask Embedded Lithography (CMEL) for fabricating polyimide nano-structures and new pentacene-based organic thin film transistors which have unique electronic characteristics.

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