Preface

The 1st Environment-Enhancing Technology and Material Science International Congress was held successfully on Minhang Campus of Shanghai Jiao Tong University on 6-8th December, 2013. This conference was organized by the School of Chemistry and Chemical Engineering, Shanghai Jiao Tong University, Chinese Center for Resource Comprehensive Utilization Technology, China Industry-University Research Institute Collaboration Association and China Technology Innovation Strategic Alliance for Environment-Enhancing Industry, and co-sponsored by University of Hawaii, China Agricultural University, Zhejiang University and University of Arizona.

The Environment-Enhancing material science and technologies should be economically viable, environmentally sustainable and have the potential to ultimately meet the human need for liquid fuel. Energy production and environmental protection are two of the greatest challenges facing mankind in the 21st century. The shared responsibilities to meet these grand challenges are unprecedented. Economic development demands energy, yet energy consumption has historically led to increased environmental pollution. In the context of our modern society, the relationship between 'environment' and 'energy' has been more often antagonistic rather than harmonious co-existence. To sustain our economy and environment, our energy sources must be environmentally enhancing. We envision that Environment-Enhancing material science and technology should be explored aiming at meeting our entire fuel need, achieving net-zero carbon emission and water use, and recycle the nutrient in the feedstock. Except for above-mentioned fields, some works in fundamental research such as theoretical and computational studies are included as well.

In recent years, the environment-enhancing technology has been applied in several countries across the world, such as USA, China, Norway, Saudi Arabia, Philippine and Chile.

In Norway, collaborating with the Biopharmia LLC, Professor Joel Cuello's team applied the Accordion technology at the University of Agder Grimstad. In Saudi Arabia, the same team applied the xylophone photobioreactor technology at the King Abdulaziz City of Science and Technology. In Philippine, they tested macroalgae bioethanal production at the University of the Philippines Diliman. In Chile, at Universidad de Magallanes, algae is harnessed from Patagonia and Antarctica for biofuels and other high-value products.

During this congress, the attending scholars presented the applications of environment-enhancing technologies, especially those related to material science, in China and other parts of the world. Every submission has been peer reviewed and commented by two independent reviewers on the quality, originality, creativity and significance of its contributions and improvements. In the end, 18 papers are accepted in the *Advanced Material Research Supplementary*, which cover fields such as polymer, inorganic chemistry, material field even theoretical research. We would like

to thank all the authors who submitted their manuscripts and the reviewers for their selfless contributions to the peer review process.

In “A Review on the Synthesis and Controlled Release Properties of Novel Responsive Carrier”, Zhu and Huang reviewed the state-of-the art in smart responsive carriers for controlled drug delivery applications and the preparation methods of different responsive materials, sustained and controlled release performance. Huang also reviewed glass transition and technology limitation on characterization on glass transitions on thin film.

In Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Cui’s group synthesized polyacrylicacid (PAA) by solution polymerization. MBA dosage, acrylic acid percentage, neutralization degree and surface crosslink on PAA have been analyzed. The experimental evidence obtained that lower acrylic acid percentage is helpful to these three properties. Indexes increase at first and then decrease with neutralization degree raise. MBA dosage is against to absorptivity and retention capability, but useful to absorptivity under pressure. Scanning electron microscopy (SEM) was used to observe the surface of the PAA powder, and prove that surface crosslink promote form a kind of honeycomb structure.

In Ren’s group in Zhejiang University, Yu prepared single-crystal pre-perovskite $PbTiO_3$ (PP-PT) nanofibers by PVA/PVP-assisted hydrothermal method, in which polyvinyl alcohol (PVA) and polyvinyl pyrrolidone (PVP) acted as surfactants. Poly (vinylidene fluoride)/ pre-perovskite $PbTiO_3$ nanofibers (PVDF/PP-PT) nanocomposite thin films were successfully fabricated by a spin-coating method. PP-PT nanofibers have been shown a good distribution in PVDF matrix. Moreover, α-phase coexisted with β-phase in the PVDF and PVDF/PP-PT nanocomposite thin films. The dielectric properties of the PVDF/PP-PT nanocomposite thin films were measured.

In the paper of “Synthesis and Applications of Gold Nanoparticles”, Zhao reviewed the synthetic methods of gold nanoparticles. The applications of gold nanoparticles in nanoprobes, drug delivery systems, photonic crystals were discussed.

In “Study on Luminescent properties of YAG: Ce^{3+}, Gd^{3+}/La^{3+} prepared by co-precipitation method”, Guan prepared the YAG:Ce^{3+}, Gd^{3+}/La^{3+} yellow phosphors by co-precipitation, and the crystal structure, morphology, luminescent properties were studied in detail.

In Lin’s group in Fujian Normal University, Shi prepared multifunctional Ag_2S-Ag heterogeneous porous nanorods by the irradiation of microwave. The nanorods were characterized by scanning electron microscopic (SEM) and X-ray diffraction (XRD). The photocatalytic activity for degradation of crystal violet and the lowest detectable limit of crystal violet were investigated further. The results indicate that the Ag_2S-Ag heterogeneous porous nanorods would be a promising material for environmental protection.

In “The Study on Evolutive Model of Heavy Metal Pollution in Urban Surface Soil and Design of Time-Series Database”, Shi established a spatial-temporal model of heavy metal pollution to track its evolution, and the Fourier transform has been

used to derive its analytical solution. The approach is innovative and the results they obtained are interesting.

Packaging technology is widely used in the production process of semiconductors, which makes a lot of wasted components stay intact and reused. In “Fill sealing material removal in electronic components using laser cutting”, Song reported that laser cutting technology was applied to remove material from PCB resin potting material. Using precision laser cutting technique, the resin potting material of waste PCB circuit can be removed, so as to expose entirely electronic components and all the solder joints. The technology has high economic benefit by ensuring electronic component function intact for reuse and improving the utilization rate of resource.

In “Chemo-mechanical Grinding for K9 Optical Glass”, Dai presented that chemo-mechanical grinding (CMG) was applied to process the K9 optical glass. High surface and subsurface qualities on the K9 optical glass specimen were obtained as the polished results by the CeO_2-CMG tools. Surface roughness and material removal rate were used to evaluate the grinding performance.

In “Study on Preparation of a High-strength and High-toughness Low-alloy Steel for Cross Member of Forklift Mask”, Yi designed a new type of high-strength and high-toughness low-alloy steel by multi-element alloying. The optimized heat treatment technique is obtained through orthogonal testing.

In “Casting Transformers APG Manufacturing Technology”, Chen studied APG (Automatic Pressure Gelation) process of epoxy resin casting transformer, which was developed toward epoxy resin vacuum casting process. The factors that influences the partial discharge experiment of transformer were analyzed, particularly the body making and casting processes.

In “New High Strength and Heat Resistance Aluminum Alloy Material for Engine Cylinder Head”, Li and Su studied the effect of Cu、Ni、Fe、Mn on the mechanical properties of Al-Si alloy by orthogonal experiment method. The ratio of Fe and Mn was controlled to prevent the appearance of β phase, and reduce herringbone Fe phase.The best content of Cu、Ni、Fe、Mn was obtained, which improved high temperature strengthening of the alloy.

In “Study on the Relativity between Intrinsic Coercivity and Microstructure of the Nd-Fe-B Magnet Treated by the Optimized Aging Process”, Ding reported that the aging process optimization was carried out to increase the intrinsic coercivity of the Nd-Fe-B magnets. The microstructures and the fractures of the Nd-Fe-B magnets treated by the optimized aging process were also investigated by optical microscope, thermal field emission scanning electron microscopy and energy disperse spectroscopy.

In “An Association of Reaction Time with bone Quantitative Ultrasound”, Mao examined the relationship between choice reaction time and calcaneus quantitative ultrasound. The results indicate that CRT may be associated with bone status, which suggests an effect of artificial bone on nervous system should be considered when it is produced.

Chitosan and its derivatives have attracted more and more attention due to their biological activities and potential applications in food, pharmaceutical, agricultural

and environmental industries. Xu reviewed antioxidant and free radical scavenging activities based upon chitosans and discussed the free radical scavenging mechanisms. Jiang investigated the antimicrobial effect of nano-SiO_2 particles in gelatin and chitosan based wound dressing materials. The impact of the nano-SiO_2 and antimicrobial agents on the water uptake ratio, water vapor permeability and the antimicrobial effect was evaluated. In biomaterials field, Liu compared solvent-casting and melt-compounding blended polylactide-polyethylene glycol mixture as drug carrier. The former offers fast degradation and drug releasing, the latter gives controlled dug release which requires better miscibility and longer release time. Degradation experiments and characterization such as XRD and SEM have been carried out to study degradation behavior, crystallization and miscibility.

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