

PROJECT ANNEX TO THE MEMORANDUM OF UNDERSTANDING
BETWEEN
THE KOREAN AGENCY FOR TECHNOLOGY AND STANDARDS OF THE MINISTRY OF
COMMERCE, INDUSTRY AND ENERGY OF THE REPUBLIC OF KOREA
AND
THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY OF THE DEPARTMENT OF
COMMERCE OF THE UNITED STATES OF AMERICA
FOR
COOPERATION RELATING THE STANDARDIZATION, CONFORMITY ASSESSMENT AND
LEGAL METROLOGY
ON
“DEVELOPMENT OF NANO-BIO REFERENCE MATERIALS AND MEASUREMENTS USING
FLUORESCENCE SEMICONDUCTOR NANOCRYSTALS”

Article 1. Scope and Objectives

Pursuant to Article VII of the Memorandum of Understanding (MOU) between the Korean Agency for Technology and Standards of the Ministry of Commerce, Industry and Energy of the Republic of Korea and the National Institute of Standards and Technology of the Department of Commerce of the United States of America Concerning Cooperation Relating to Standardization, Conformity Assessment and Legal Metrology, NIST and KATS wish to provide a mechanism for cooperation in development of new reference standards of fluorescent semiconductor nanocrystals for biological assays. This Project Annex is not “joint research” for purposes of Annex I of the Agreement Relating to Scientific and Technical Cooperation Between the Government of the United States of American and the Government of the Republic of Korea, signed on July 2, 1999.

The nanocryatalline industry is rapidly growing especially in the US market: up to \$7.5 billion from the year of 2000 to 2005 (<http://www.nanosphere-inc.com>). Unfortunately, the current understanding of fluorescence measurements based on these novel nanocrystals (NCs) is limited and insufficient to support the rapidly emerging nanomaterial industries. In response of recent ISO call NCs are perfect candidates for the development of a secondary reference. The heightened awareness of industry and regulators for quality and standardization in measurements (ISO 9000 and ISO 25) has resulted in an increasing call for secondary standards for fluorescence directly traceable to the national radiometric scales. In anticipation of the demand of such standards, the US National Committee for Clinical Laboratory Standards (NCCLS) has also proposed the creation of a standing subcommittee to facilitate the introduction of fluorescence industrial standards in clinical applications. It is expected that the same requirement soon will be extended to applications of novel nanocrystalline materials.

Article 2. Cooperative Activities

[Phase I: 6 months] Characterization of optical properties (e.g. blinking, spectrum, and quantum yield) of bio-conjugated single NCs for the development of standard test methods of surface conjugation of phtoexcited CdSe NCs using laser confocal microscopy. Quantitative analysis of the results to establish fluorescence reference standards of the NCs in various surface functionalizations.

[Phase II: 6 months] Development of standard fluorescence energy transfer (FRET) method using NCs as FRET donors for the detection of the binding of DNAs onto the surface of the NCs. Binding assay of fluorescence-dye-labeled single stranded DNA onto the surface of a NC will be developed to measure FRET signal from the NC to the fluorescent dye attached to the DNA. FRET references in this system will be developed.

Article 3. Implementing Agencies

The implementing agencies under this Annex will be NIST, KATS, and the Biomedlab Co (BMLC).

Article 4. Intellectual Property

Neither NIST, nor KATS should attempt to limit the distribution or the use of the technical results of this joint effort. The parties do not anticipate the creation of or exchange of intellectual property during the course of this Annex. However, notwithstanding above statements, issues for the protection and distribution of intellectual property created or furnished in the course of cooperative activities under this MOU shall be settled in accordance with the provisions in the Article 5.2 of the NIST-KATS MOU. The work conducted under this Project Annex is not "joint research" for purposes the NIST-KATS MOU and for purposes of Article II B2 of Annex I to the Agreement Relating to Scientific and Technical Cooperation Between the Government of the United States of American and the Government of the Republic of Korea.

Article 5. Project Finances and Services

NIST and KATS will each be responsible for their own costs and for their own depreciable equipment and materials. However, KATS will make an arrangement for the transfer of approximately ₩90,000,000 (Korean Won) to support the research activities at NIST in accordance with Attachment 1. Within 30 days after the signing of this project Annex, the KATS shall make an arrangement to deposit the agreed funds into NIST account according to the method that NIST designates. The actual funds provided to NIST may be adjusted prior to deposit with NIST in accordance with the laws, acts, and regulations of Korea Ministry of Commerce, Industry and Energy. KATS shall provide prior written notice to NIST of the actual amount to be transferred.

NIST intends to provide following services:

Recruit a qualified postdoctoral fellow.

Provide professional assistance to the postdoctoral fellow to conduct this project Annex.

Provide the postdoctoral fellow access to laboratory space and equipment and administrative support

Provide professional supervision, access to laboratory space and equipment, and administrative support to other guest researcher(s) who may be sent by KATS to NIST during the course of this Project Annex;

NIST shall not be responsible for the expenditure of the visiting researcher(s).

Report of Project Expenses: NIST manager will submit expenditure report to KATS within 60 days after this project Annex is completed. If there is any remaining balance, or if this project is terminated prior to the expenditure of the funds, subject to applicable laws and regulations, NIST shall refund any remaining balance within 90 days after receiving a written notification from the KATS. .

Article 6. Planning

The implementing organizations designate the following individuals as project managers and as the points of contact for implementation of these activities. These individuals should, at times mutually established, plan and review activities under this Project Annex.

Project managers:

NIST: Jeeseong Hwang, Optical Technology Division, Physics Laboratory.

KATS: Jae Heyg Shin, Materials and Components Standards Division

BMLC: Jongwon Kim, President

Article 7. Commencement and Termination

The activities under this Project Annex shall begin upon execution of this Annex by the two organizations. The activities should continue while the Memorandum remains active, but activities initiated under this Annex may continue to completion based on the agreement among the above mentioned project managers, unless terminated by either side upon thirty days written notice to the other side. The project Annex may be amended or extended by written agreement of NIST and KATS. The termination of this project Annex shall not affect the validity or duration of projects under this project Annex that are initiated prior to such

termination. This Annex is not intended to be legally binding upon the parties and shall not be the basis for any legal cause of action between the parties and any other partially participating agencies, whose participation is agreed by two parties.

Signed in Seoul Korea, on the 12th day of June, 2004, and in Gaithersburg, MD, USA, on the 13th day of July, 2004, in duplicate, in the English language.

THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY OF THE DEPARTMENT OF COMMERCE OF THE UNITED STATES OF AMERICA

By Albert Parr
Name: Dr. Albert Parr
Title: Division Chief, Optical Technology Division

By William R. Ott Jr.
Name: Dr. Katharine Gebbie
Title: Director, Physics Laboratory

By William Smoot
Name: William Smoot
Title: Chief, Finance Division

THE KOREAN AGENCY FOR TECHNOLOGY AND STANDARDS OF THE MINISTRY OF COMMERCE, INDUSTRY AND ENERGY OF THE REPUBLIC OF KOREA

By Ik Soo Kim
Name: Ik Soo Kim
Title: Director, Materials and Components Standards

By Sun Ho Kim
Name: Dr. Sun Ho Kim
Title: General Director, Department of Manufacturing Technology and Standards

Attachment 1

Treas NYC (Account is with the Federal Reserve Bank of New York)
U.S. Dept. of Treasury
FMS-Banking Operations Branch
3700 East West Highway, Room 5A05
Hyattsville, MD 20782
Phone# (202) 874-6617

ABA# 021030004
Account# 13060001
Account Name - TREAS NYC/CTR/BNF=/NIST/AC-13060001

OUR ACCOUNT NUMBER AND NAME ARE OF CRITICAL IMPORTANCE AND MUST BE REFERENCED IN ORDER FOR NIST TO BE PROPERLY CREDITED WITH YOUR PAYMENT. IT MUST APPEAR IN THE PRECISE MANNER SHOWN TO ALLOW FOR THE AUTOMATED PROCESSING AND CLASSIFICATION OF THE FUNDS TRANSFER MESSAGE. IN ADDITION, PLEASE REFER TO THE NIST INVOICE NUMBER, THE NIST-KATS PROJECT ANNEX ON DEVELOPMENT OF NANO-BIO REFERENCE MATERIALS AND MEASUREMENTS USING FLUORESCENCE SEMICONDUCTOR NANOCRYSTALS", YOUR COUNTRY, AND ANY OTHER PERTINENT INFORMATION THAT WOULD HELP US IDENTIFY WHAT YOUR ORGANIZATION IS PAYING.

THIS TRANSFER OF FUNDS CAN ONLY BE ACCOMPLISHED BY YOUR ORGANIZATION GOING THROUGH A U.S. CORRESPONDENT BANK OR BY HAVING YOUR COUNTRY'S CENTRAL BANK SEND A SWIFT TELECOMMUNICATION SYSTEM MESSAGE TO THE FEDERAL RESERVE BANK. BE SURE TO COVER ANY PROCESSING FEES YOUR BANK MAY CHARGE YOU.