



INPHAZE HiRes-EIS

高分解能電気インピーダンス・スペクトロスコピー **INPHAZE**

INPHAZE ユーザ、及びプロジェクト

太陽電池

The Economic Development Board of Singapore and the National University of Singapore have jointly established the Solar Energy Research Institute of Singapore (SERIS) in 2008 to boost Singapore's role in the solar energy sector. SERIS will focus on applied research in the field of photovoltaics and energy efficient buildings, including advanced characterization of various types of solar cells. SERIS' Characterization Laboratory is headed by Dr Bram Hoex and as the main tool an **INPHAZE** HiRes-EIS system has been acquired. A close collaboration is now ongoing between **INPHAZE** and SERIS to further develop the use of EIS in the field of photovoltaics.

The University of New South Wales in Australia hosts one of the world's foremost photovoltaic research centers, headed by Prof Martin Green. The **INPHAZE** system has been used to characterize photovoltaic cells produced by this group, and shown some very interesting results. (Discussed in the **INPHAZE** Photovoltaic Cell Application Note.)

INPHAZE is also cooperating with one of the key solar cell research groups in Germany, at the Max Planck Institute for Microstructure Physics in Halle.

膜及び膜の汚染

Water desalination and reclamation plants are based on the use of reverse osmosis membranes (RO). Researchers at the University of Sydney have shown that the **INPHAZE** HiRes-EIS systems are capable of distinguishing fine detail in these membranes, as well as detecting fouling of the membranes at a very early stage in the plant running cycle. (**Fouling of reverse osmosis membranes using electrical impedance spectroscopy: Measurements and simulations** J.M. Kavanagh, S. Hussain, T.C. Chilcott, and H.G.L. Coster, Desalination, 236, 187-193, 2009). As a novel fouling detector for membranes, the **INPHAZE** instrument offers potentially large savings in energy usage and improved productivity.

Based on these preliminary findings, a major collaboration is commencing between **INPHAZE** and the Singapore Membrane Technology Centre (SMTC) headed by Professor Tony Fane at Nanyang Technological University.

無機物の処理

The **INPHAZE** instrument can also be used for characterizing particles in mineral flotation, and this will be demonstrated in a new cooperation with the Ian Wark Research Institute in South Australia and a special sample chamber is being constructed for this application.

バッテリー & 燃料電池

Batteries have become of great interest to bring about more efficient energy usage. One of the R&D challenges for batteries, and fuel cells, is the optimization of the membranes used. Several of groups are using the **INPHAZE** system to characterize their low impedance membranes. Collaborative projects have just commenced.

生体工学バイオニクス

INPHAZE is engaged in an ongoing research collaboration project with leading aural implant company Cochlear. Surface coatings are being tested with the goal of improving the Cochlear hearing implant devices.

ナノテクノロジー/有機薄膜

The research group of Prof Michael James at the Bragg Institute of ANSTO (Australian Nuclear Science and Technology Organisation) studies thin films, surface coatings and self-assembled monolayers (SAMs). The key is to functionalize silicon wafers and other substrates for the development of biocompatible materials and in bio-sensing applications. (**Characterisation of Alkyl-Functionalised Si using Reflectometry and AC Impedance Spectroscopy**, E.L.S. Wong, M. James, T.C. Chilcott, and H.G.L. Coster, Surface Science, 601, 5740-5743, 2007.)

A set of complimentary technologies: **INPHAZE** HiRes-EIS, X-ray reflectometry, and neutron reflectometry are being employed for these studies. A new sample chamber for simultaneous impedance spectroscopy and neutron beam experiments has been developed.

高分子及び生体高分子

It has recently been shown that thin layers of polystyrene can be characterized efficiently with the aid of the **INPHAZE** instrument

This line of work is now being extended to polyamines at the University of Sydney, in the research program headed by Prof Marcela Bilek and Prof Tony Weiss, to develop high-performance surface coatings. Their goal is to create biocompatible surfaces for medical devices. The **INPHAZE** spectrometer is being used for surface characterization.

細胞膜

At the Ian Wark Institute in South Australia, Dr Dusan Losic and his group are developing nanopore and nanotube materials for applications in molecular separation, biosensing and drug delivery. They are using the **INPHAZE** HiRes-EIS system as one of their characterization



Electrical characterizations of biomimetic molecular layers on gold and silicon substrate

R A Afg amr
 aiglelbF E Am rpe f gm mega spckclr
 Rfg umpi g msrm c
 cvrcbcb rrfcSlgtcp gnd blc p g
 lbfgrc kugrfrfcem mdbctc mngle lcu
 gm cl bop gelcb ncag a dmpdmpcl gann ga rgml
 mdfsk l mlck rcpq lbdmprfcbrcargmndeclcrq
 ksr rgml

rSlgtcp gAm cecmlbmlrfcepmsn md pmd lg
 Fm bcp rsbgcfcfsk l p glkc l mdrmkemp nf
 Mlc mdrfcpc c pafmrfgepmsn p g raCep l
 f lmu kmtcb m rfc Slgtcp gr md blc lb
 c r ganfcb mepmsgtcf s crfc FC
 Fg c C ugkf ncag bc gelckks rgn clmp
 rmkmk ep nf cvncpgkclr

l bbgrgrmrffcumpi ml rfcfsk l p glp aCuci
 g glntc rge rfcclc mlsgrglekncb la
 rmkmep nf rm brcar pc r a lacp

端作抄

インピーダンス範囲:	1 0 ¹ % oh m	0 . 1
フェーズ分解能:		0 .
マグニチュード誤差:		0 . 0 0 2 %

