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## Development of new materials for flexible transparent electrodes

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In recent years, the demand to develop transparent flexible and conductive electrodes has risen sharply, in particular the need to find a replacement for ITO based electrodes. The present work is focused on the development of new materials for transparent conducting electrodes. The conducting films have been produced using a modified Pedot: PSS mixture and an automated programmable spray system is used which deposits the polymer composite onto PET and polycarbonate substrates creating smooth homogeneous films. The dimensions and thickness of the film can be controlled and size of area of the film is only limited by spraying system dimensions providing a readily up scalable film deposition technique. Varying Pedot: PSS film thicknesses from <100 nm to >200 nm (corresponding to films of various %T values of >95% to <75%) were deposited and characterized primarily by UV-Vis spectrometry and 4-point resistance measurements. Novel treatment of these films using varying chain length alcohols and formic acid resulted in a huge improvement in sheet resistance values in the range of 3-4 orders of magnitude from the untreated films. This improvement in the conductive properties of Pedot:PSS films has brought them into the realm of an industrial applicable material comparing favorably with other transparent conductors in the market. The combined readily scalable process employed in producing the films and improvement in film properties opens up a world of potential applications from photovoltaic cell to display technologies.

### Biography

Yurii Gun'ko has received his Ph.D. in Inorganic Chemistry from Moscow State University in 1990. Currently, he is a Professor of Inorganic and Materials Chemistry in the School of Chemistry and a principal investigator in CRANN institute in Trinity College Dublin (Ireland). Prof. Gun'ko has published over 160 journal publications, 12 patents and 8 book chapters. His main research interests and activities are polymer composites, photovoltaics, magnetic and quantum dot based nanomaterials.

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## Using polysulfone member to separating hydrogen from $H_2/CH_4/C_3H_8$ gas mixture

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Using membrane to separate gas is the implementation of polysulfone Hollow-fiber gas separation membrane, has a great membrane surface packed in a small volume. Results of laboratory studies have shown that when a gas mixture consisting of $H_2/CH_4/C_3H_8$=20:50:30 is treated in a hollow-fiber member under 5 kg/cm2, the hydrogen concentration is raised from 20 mol% to 71.3 mol%. If the hollow-fiber member is re-arranged in parallel connection, the recovered hydrogen concentration can be as high as 74.9 mol%. Additionally, controlling the influent pressure at 5 $kg/cm^2$ and influent gas mixture flow rate is raised from 120 ml/min to 200 ml/min, the resulting hydrogen concentration can be raised from 63.3 mole% to 82.4 mole%. If the hollow-fiber member is re-arranged in parallel connection, the recovered hydrogen concentration can reach 86.7 mole%. Therefore, hollow-fiber member can be implemented to recover hydrogen gas from the gas mixture at low pressure. This hydrogen-recovery method has the advantage of low capital cost, simple to operate and small energy consumption.

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