Permeation of hydrogen atoms through dense hollow fiber

Siek-Ting Yong and Lai-Ling Wong
Monash University Malaysia, Malaysia

It is crucial to achieve high purity of hydrogen for the use in renewable energy industry. Purification of hydrogen using dense hollow fiber is one of the common ways employed. The transport mechanism of hydrogen from one side of the membrane to the other side involves a series of sequential steps. It started with the adsorption and dissociation of hydrogen molecules, then absorption and diffusion of protons, followed by recombination and desorption of hydrogen molecules. The dissociation of hydrogen molecules on the membrane surface plays the most critical role in the overall transport mechanism. In this work, a novel post-treatment method using aluminum nitrate solution was developed. The objective is to achieve high Hydrogen permeability and ideal selectivity in parallel by improving the morphology of hollow fiber via mobility control of polymer chain. Morphologies analyses including FTIR-ATR, DSC and EDX were carried out and the mechanism of chemical surface modification was proposed.

estee.yong@monash.edu

Investigation of the effect of adding As on the optical properties of dilute nitride GaPN alloys with rapid thermal annealing effect

H Albalawi1,2, V Orsi3, Y Gobato1, H Vinicius1, M Peron1, D Taylor1, S Almosni4, C Cornet4 and M Henini1

Dilute Gallium Arsenide Phosphide Nitride, GaAsPN, alloys grown on GaP substrates have recently received significant attention due to their unique optical properties and potential applications in optoelectronic integrated devices. It has been reported that with increasing N composition, the optical efficiency deteriorates while the band gap energy of the alloy decreases. In this work, we will report the optical properties of as-grown and heat treated dilute nitride GaAsxPyN1-x-y samples having different x and y concentrations using photoluminescence (PL). Annealing GaAsPN alloys at 800˚C for five minutes using rapid thermal annealing (RTA) leads to significant increase of the PL intensity and a shift of the PL peak to higher energies. An anomalous temperature dependence of the PL spectrum has been observed in most GaAsPN/GaP hetero structures studied in this work. The PL peak energy as a function of temperature exhibits an inverted S-shape. This unusual behaviour is explained by strong localization of carriers at low temperatures that could be induced by the presence of nitrogen. The impact of As incorporation and thickness of GaAsxPyN0.020 on the localization energy has been investigated. We found that increasing the thickness of the GaAsPN epilayer significantly results in diminution of the optical properties.

ejxzhma@nottingham.ac.uk

Notes: