Passive elements for fibre optical communication systems (dense wavelength division multiplexing (DWDM) components) based on liquid crystal (LC) cells can successfully compete with the other elements used for the purpose, such as micro electromechanical (MEM), thermo-optical, opto-mechanical or acousto-optical devices. Application of nematic and ferroelectric LCs for high-speed communication systems, producing elements that are extremely fast, stable, durable, of low loss, operable over a wide temperature range and that require small operating voltages and extremely low power consumption. The known LC applications in fibre optics enable one to produce switches, filters, attenuators, equalisers, polarisation controllers, phase emulators and other fibre optical components. Thus LC photonics became a ‘hot topic’ of LC research and the Liquid Crystal Photonics Conferences started in Europe in 2006 were really successful and attracted top LC scientists from all over the world.

The purpose of the Workshop LCP 2010 was to provide a forum for LC scientists, researchers and engineers around the world in Asia to present their pioneering work on recent progress in LC research for photonics and displays and to exchange their ideas with one another. The workshop was also aimed to enhance the competitiveness of the local academics and photonics industry through sharing of the latest technology updates in the industry. Discussions provided a state-of-the-art overview of the area, highlighting the latest advances and possible future directions. Research activities, presentations and discussions of new results in the LC photonics area were extensively represented as the main activities.

The workshop had a large number of plenary (five) and invited (26) speakers from countries including the USA, Canada, Europe, Japan, Taiwan, Hong Kong, Singapore, Russia, China (total 15 countries), to enable cross-fertilisation among researchers working in LC materials and devices. The workshop had papers in interesting or novel applications, such as fibre sensors (Prof. Shum, Singapore and Prof. Lu, China), optical wavefront control devices (Prof. Bos, USA), LC optical waveguides (Prof. d’Alessandro, Italy and Prof. Neyts, Belgium), THz LC devices (Prof. Parka, Poland and Prof. MacPherson, Hong Kong), beam steering elements (Prof. Valyukh, Sweden), silicon microdisplays (Prof. Underwood, UK), three-dimensional (3D) devices (Dr. Surman, UK), solid state lighting (Dr. Huang, Hong Kong) or papers that enhance LC material properties for photonic and display applications, such as blue phases (Prof. Wu, USA), azo-dye doped LCs (Prof. Fuh, Taiwan), photoresponsive LCs (Prof. Tabiryan, USA), polymer-dispersed LCs (Prof. Sun, Singapore), metamaterials (Prof. Khoo, USA), smectic nano-structures (Prof. Pozhidaev, Russia), fast switching LCs (Prof. Komitov, Sweden), colloidal particles (Prof. Zumer, Slovenia), photocontrollable liquid crystalline polymers (Prof. Shibaev, Russia), new active matrix liquid crystal display (LCD) materials (Dr. Takatsu, Japan), new optical geometries for viscous-elastic measurements and LC fibre optics applications (Prof. Pasechnik, Russia). An excellent presentation on arbitrary spatially varying pretilt angles was made by Prof. Kwok (Hong Kong), who also reviewed new applications of this technique in tunable LC lenses, beam steering and diffraction LC devices.

Many authors outlined in their presentations the advantages of photoalignment technology, and in particular photoaligned azo-dyes for LC photonics applications. Photoalignment possesses obvious advantages in comparison with the usually ‘rubbing’ treatment of the substrates of LCD cells. Possible benefits for using this technique in photonics LC devices include: (i) new advanced applications of LCs in fibre communications, optical data processing, holography and other fields, where the traditional rubbing LC alignment is not possible due to the sophisticated geometry of LC cells and/or high spatial resolution of the processing system; (ii) the ability for efficient LC alignment on curved and flexible substrates; (iii) manufacturing new optical elements for LC technology, such as patterned polarisers and phase retarders, tunable optical filters, variable optical attenuators, etc. Prof. Chigrinov (Hong Kong)
mentioned in his presentation the **photoaligning materials** developed by the Hong Kong University of Science and Technology (HKUST) team based on photo-polymerised and cross-linked dye photosensitive layers, that enable (i) high-order parameters; (ii) excellent alignment quality of nematic and ferroelectric LC materials in various modes; (iii) temperature and ultraviolet (UV) stability due to the polymerisation and cross-linking effect in dye layers; (iv) perfect adhesion and anchoring energy comparable with rubbed polyimide (PI) layers; (vi) excellent sensitivity with a minimum exposure energy; (vii) the ability to align LC materials in curved surfaces and photonic holes. Prof. Wolinski (Poland) and Prof. Tabiryan (USA) mentioned a variety of tunable LC photonics elements that used photoalignment technology, such as LC-filled photonic crystal fibres, switchable q-plates and photo-tunable band gap LC materials. Prof. O’Neill (UK) also discussed a photoalignment technology to orient light-emissive semiconductor materials to enable a polarised source of emitting light.

An interesting presentation of the new applications of LCs for polymer planar lightwave circuit devices was made by Prof. Chan from City University in Hong Kong. He considered LCs as an excellent new material for tunable LC photonics devices based on polymer fibres. Prof. Aaron Ho outlined in his presentation the application of optical retardation modulation in phase sensitive surface plasmon resonance biosensing. He considered LCs as a new material, which can make the plasmon sensors properly tunable in a wide range of light incident angles.

Several researchers provided a theoretical investigation of new LC modes suitable for photonics applications, such as localised optical modes for efficient lasing in chiral LCs (Prof. Belyakov, Russia), computational generation of optical signals and textures developed in LC systems (Prof. Hwang, Canada), polarisation gratings and electro-optics of deformed helix ferroelectric LCs (Prof. Kiselev, Ukraine), blue phase textures (Prof. Wu, USA and Prof. Zumer, Slovenia) and ordering and alignment in LC metamaterial composites on macroscopic and molecular scales (Dr. Gorkunov, Russia). Several interesting oral and poster presentations were also available, such as fast low-voltage field sequential colour ferroelectric LCs (Qi Guo, Hong Kong), in-cell LC waveguides (S. Pasechnik, Russia) and a non-absorbing polariser converter (Dr. Tsvetkov, Russia).

The sponsors of the event were Croucher Foundation, School of Engineering and the Department of Electronic and Computer Engineering of the HKUST. The participants were acquainted with LC research in the three universities...
of Hong Kong (HKUST, City University and Chinese University). The cultural program included boat trips in Victoria Harbor and Lama Island, as well as visiting an excellent seafood restaurant in Sai Kung (Hong Kong New Territories). The conference had two welcome receptions at HKUST and Nam Shan Village in Sai Kung. Some pictures of the conference are shown in Figures 1–4.