



**The Chinese University of Hong Kong**  
**Non-confidential Abstract of Technology Disclosure**

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**Title:**

**Wide Dynamic Range Phase-sensitive Surface Plasmon Resonance Sensor with the Application of Long Range Surface Plasmon Resonance**

**Inventor:**

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**CUHK Ref. No.:**

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**Patent Status:**

US Patents Pending

**Non-confidential abstract:**

The present invention is to provide a phase-sensitive SPR device that offers wide dynamic range and high detection resolution as compared to the previous reported approaches. However the drawback is in its relatively low dynamic range compared with the traditional angular-based SPR technique. The new SPR device is based on the use of a converging optical beam instead of a parallel one, which is currently being used in all existing phase-sensitive SPR schemes. The output signal beam in the system in fact contains SPR information coming from many illumination angles covered by the numerical aperture of the beam. Consequently, if one uses an optical detector array to collect the light energy of the entire beam, the signal from each detector element is equivalent to conducting SPR detection at a specific angle. The number of elements present in the array also governs the range and resolution of the angles covered by the system. The introduction of a converging light source in phase-sensitive SPR sensor system not only drastically increases the detection dynamic range of the system. This also permits the incorporation of LRSPR sensor layer design, which is known to offer very high detection resolution because of its narrow resonance peak, so that its limited operational range can be compensated by the multi-angle approach. The resultant system therefore offers high measurement resolution and wide dynamic range, which may application in a range of biomedical detection applications.

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