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Short Communication

A Brief Report: Clinical Healthcare (ie, Breast Cancer) with 3D Photonic Quantum Ring Laser

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We show a non-invasive brain/breast diagnostic site by means of microscopic angle- resolved coherent tomographic infrared spectroscopy (ACTIRS), with ultra-low threshold current 3D photonic quantum ring (PQR) laser devices, while creating unexpected 3D blue-shift spectra from CW/CCW helical standing wave propagation within the PQR's 'self-born' resonant toroidal cavity. We note that London's St. Paul dome is famous as 2D whispering gallery (WG), below which is the first 2D WG laser, made by AT&T (1992), as shown in Figure 1 (left). Next, Figure 1 (right) shows the Baptistery of St. John in Pisa, whose dome would allow 3D whispering cave mode (WCM) instead, an ideal example for the 3D PQR laser of resonant double helix.

Figure 1: (left) London's St. Paul dome with 2D WG; first 2DWG laser, AT&T(Slusher) APL 60, 289 (1992);

Figure 1 (right) Baptistery of St. John in Pisa, an ideal example for PQR laser of Resonant Double Helix Waves within toroidal WCM cavity.

We also add that angle-resolved light cones (ALCs) suggest macro-to-micro1:1 correspondence, or Penrose's conformal cosmology of big bang in near free-vast space vs. the ALCs from 3D PQR, in time-like features propagating through murky and bloody medium of human organ. Cerebro-Spinal Fluid (CSF) gradient can be detected along carotid canal to brain, the blood line concentration gradient, through Bernoulli relation between flow and pressure in checking the CSF state.

3D PQRs with unusual WCM behaviors and very low threshold currents, are shown in Figures 2 and 3.

Figure 2. PQR Laser

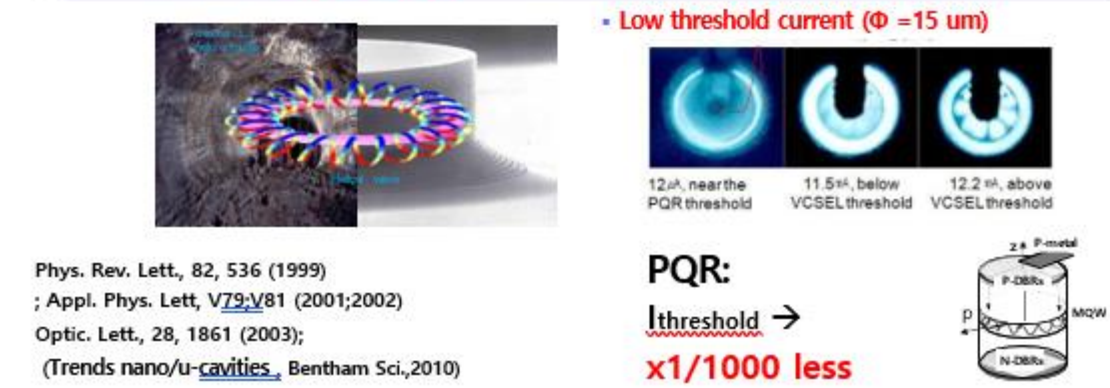
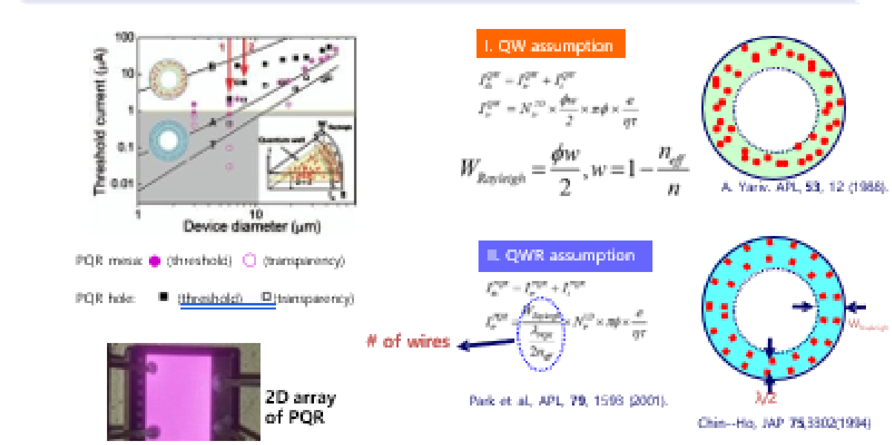


Figure 3. PQR Threshold Ith Ahn et al, PRL, 82, 536 (1999). Kwon et al., APL, 89, 11108 (2006).



The PQR's helix modes of the WCM can be decomposed into a bouncing wave between the two DBRs and a circulating wave of in-plane total reflection for a simplified analysis. The corresponding angles θm of the quantization emission are given in Figure 4 where m is a mode index corresponding to the first zero of the Bessel function

Figure 4. ACTIRS (Angle-Coh-Tomo IRS): PQR Spectra of 3D WGM

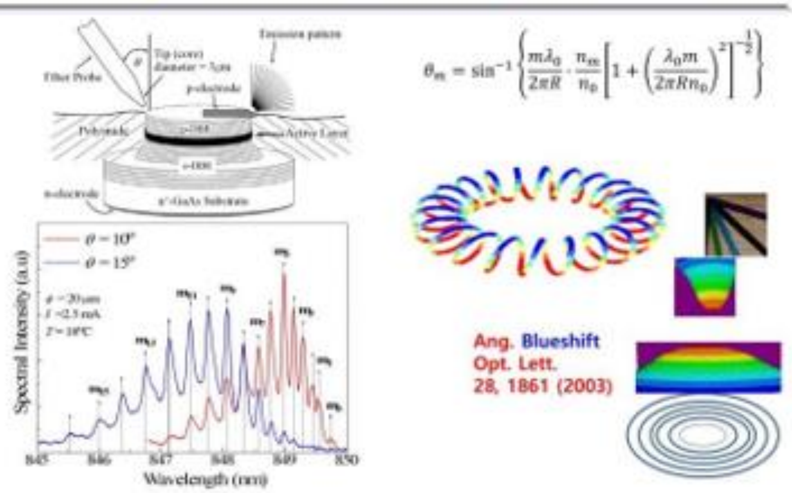
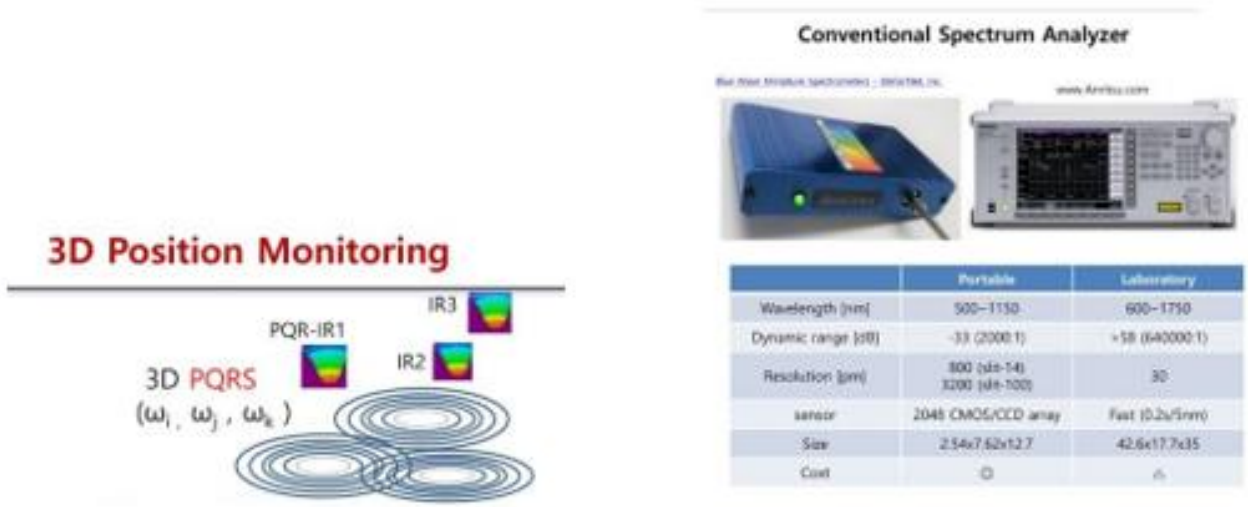


Figure 4-3D positions & Spectrometers



When the ACTIRS data, Figure 5-transmission mode, are fully developed toward gathering large clinical data accumulations enough for computing analysis, and when it becomes portable as well, then we will feel easy and do not keep worrying seriously regarding our brain, breast, heart or other clinical healthcare for our wellness; the breast cancer in particular sticks in my mind as given in the conclusion.

Figure 5-transmission mode

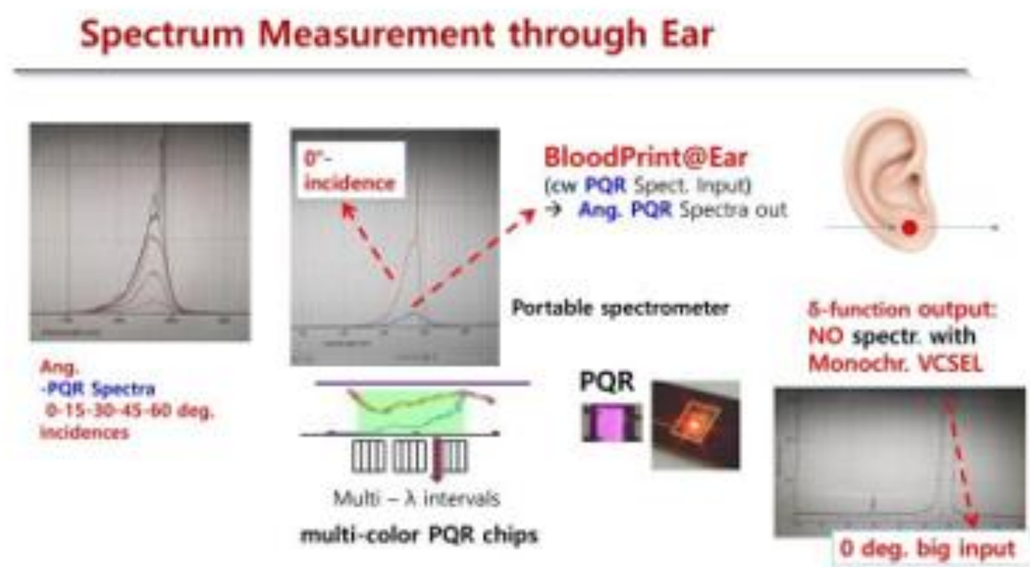


Figure 5-reflection mode

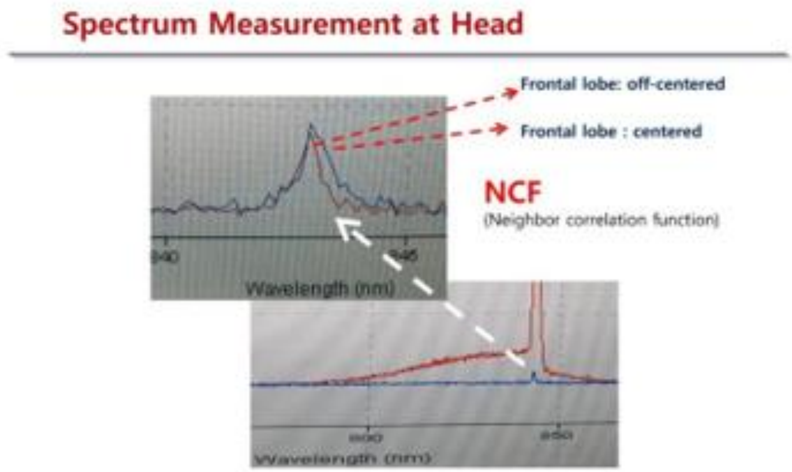


Figure 5-device-linewidth

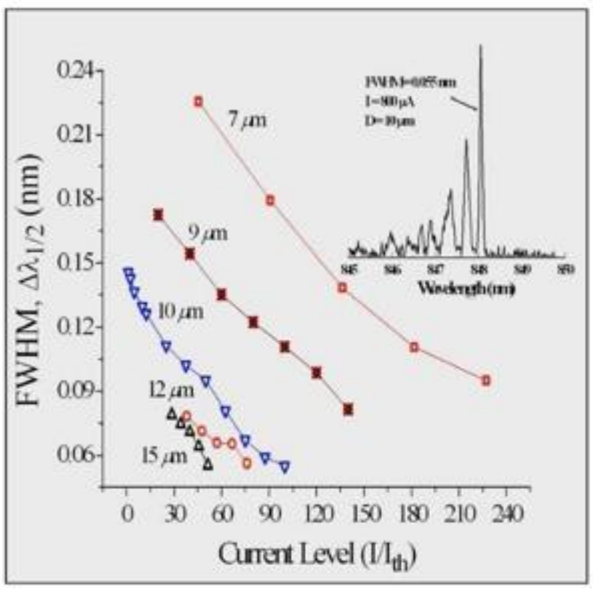
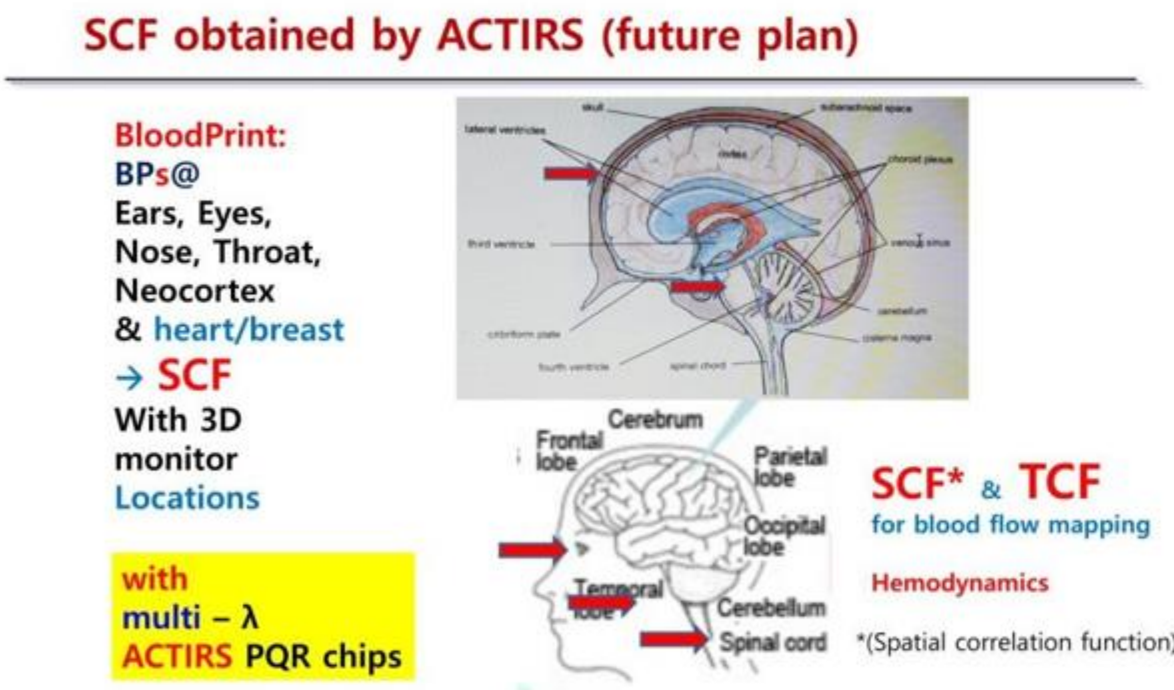


Figure 5-device shows a collection of linewidth data being almost inversely proportional to the device size as expected. The narrowest linewidth observed with an optical spectrum analyzer to date from a 10 µm PQR is 0.55 Å at an injection current of 800 µA. We also note that with wet etching steps employed instead of dry etching, the Q factor reached up to 20,000 while the linewidth approached 0.4 Å .

Now we figure that the helical WCM standing wave manifold transiently induces concentric PQRs for imminently recombinant carriers present in the Rayleigh region W(Rayleigh) of the 2D quantum well. This in turn exhibits extremely small thresholds in the µA-to-nA range with the given sq.-rt. T dependent thermal stabilities.

The clinical data and our key conclusion return to the important future for female agonies (Figure 6): Major hospitals for the old and young patients of breast cancers appear to have no doors to knock. One of my family members is trying to overcome the hard ordeals. Unfortunate half of humans in the world suffer, with no answer for treatments in advance. How many deaths will it take? The answer is blowing in the wind: Now let’s break this door. The ACTIRS data, Figure 5-transmission mode, are hopefully developed through large clinical data accumulations, while becoming remote and portable as well for personal handling.

Figure 6 –breast, brain, heart



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