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**RA03** **15 min 9:04**

X-RAY RESONANT IRRADIATION AND HIGH-Z RADIOSENSITIZATION IN CANCER THERAPY USING PLATINUM NANO-REAGENTS

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We describe the atomic-molecular-bio physics of X-ray irradiation of High-Z heavy-element nanomaterials as radiosensitizing agents in cancer therapy. Our reports in past few ISMSs showed that compounds of High-Z elements, Pt and Au, embedded in tumors could provide the most efficient therapy and diagnostics (theranostics) when X-rays are targeted at their resonant energies. Harmful damages due to unnecessary broadband radiation from conventional X-ray sources can be reduced considerably by using a monochromatic X-ray source at resonant energy. We will present our recent findings from Monte Carlo simulations, using Geant4 code, for X-ray energy absorption and dose deposition in tissues where the broadband X-ray sources have three different peak voltages, 100 keV, 170 keV and 6 MeV. We use platinum as an agent for killing cancerous cells via increased linear-energy-transfer (LET) and dose enhancement. We find that X-ray energies in the range below 100 keV are most efficient in achieving both the required tissue penetrative depths and deposition of energy. This confirms the previous results for Au that it is only the low-energy component around 100 keV from the 6 MV linear accelerator (LINAC) that is most effective in dose-enhanced cell killing. Preliminary experimental results cancer cells with Pt and results on $K_\alpha$ radiation of Al will also be presented.[a]

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**RA04** **15 min 9:21**

LASER INDUCED FLUORESCENCE SPECTROSCOPY OF SCANDIUM MONOIODIDE

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The laser induced fluorescence spectrum of scandium monoiodide (ScI) between 787 and 814 nm has been recorded. ScI molecule was produced by reacting laser vaporized Sc atoms with methyl iodide ($CH_3I$). Spectra of eleven vibrational bands of the $C^1\Sigma^+ - X^1\Sigma^+$ transition of ScI were obtained and analyzed. A merged least-squares fit of the measured line positions yielded accurate molecular constants for the upper levels of the $C^1\Sigma^+$ state and the v = 1 - 4 levels of the $X^1\Sigma^+$state. One vibrational band observed at 11627 $cm^{-1}$ belongs to a sub-band transition of the $a^3\Delta$ state, which is found to be perturbed by the $X^1\Sigma^+$ state. Details of the perturbation and molecular constants obtained will be reported.

**RA05** **15 min 9:38**

THE SPECTROSCOPY STUDY OF UF AND $UF^+$

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Uranium metal has been laser ablated in a pulsed-jet expansion of 0.1% $SF_6$ in He to generate the fluoride. Spectroscopic data are obtained using the laser-induced fluorescence and resonance-enhanced multiphoton ionization techniques for gas-phase UF for the first time. The pulsed-field ionization zero electron kinetic energy (PFI-ZEKE) technique is used to study the low-lying states of $UF^+$. The ionization potential from PFI-ZEKE for UF is found to be $D_e$ = 51137 $cm^{-1}$. $\Omega$ states up to $\frac{13}{2}$ and vibrational states $v^+$ = 0-4 are observed in the REMPI and PFI-ZEKE spectra. Assignments of the electronically excited states are based on measured $\Omega$ values and high-level ab initio calculations.