Single bunch operation, the generation of ultra-short light pulses at storagerings and their application KEK, Japan
Feb 28-Mar 1, 2005

Introduction of the time-resolved single-photon-counting VUV spectroscopy at NSRL

Guobin Zhang
National Synchrotron Radiation Laboratory (NSRL)
University of Science and Technology of China
Hefei, P. R. China
Introduction of NSRL
# Introduction of NSRL

## Main parameters of HLS ring

- **Electron Energy** $E$ 800 MeV
- **Beam Current** $I$ 100-300 mA
- **Bend Field** $B$ 1.2 Tesla
- **Curvature Radius** $\rho$ 2.22 m
- **Char. Wavelength** $\lambda_C$ 24(4.8) Å
- **Circumference** $L_C$ 66.13 m
- **RF Frequency** $f_{RF}$ 204 MHz
- **Harmonic Number** $h$ 45
- **Revolution Period** $T_C$ 220 nS
- **E-Loss /e$^-$ / turn** $U_o$ 16.3 keV
Introduction of NSRL

Brilliance from HLS

Photon energy (keV)

Brilliance
Photons/s / mm² / mrad / 0.1%BW)

Wavelength (nm)
Introduction of NSRL
Introduction of NSRL-beamlines and endstations

- **U1**: X-ray lithography
- **U4**: IR and Far IR Spectroscopy
- **U7A**: LIGA
- **U7B**: XAFS
- **U7C**: X-ray Diffraction and Scattering
- **U10**: Photo-Chemistry
- **U12A**: Soft X-ray Microscopy
- **U14**: Atomic and Molecular Spectroscopy
- **U18**: Soft X-ray MCD
- **U19**: Surface Physics
- **U20**: Photoelectron Spectroscopy
- **U24**: VUV Time-Resolved Spectroscopy
- **U25**: VUV Circular Dichroism Spectroscopy
- **U27**: Metrology and Spectral Radiation Standard
Single photon counting system

Storage ring

Beamline (Seya-Namioka)

sample

luminescence

Imaging spectrograph (Acton275)

Imaging Photon detector (Quantar2601)

Preamplifier 9306

Time pick-up

Position analyzer

ADC-X

ADC-Y

Position analyzer

Computer

Multichannel analyzer

ADC-t

MPA/SBB

TAC567

Delay 425

start

stop

Synchronization signal from RF

CFD 583 or 9307

Filter

Output device
Single photon counting system
Examples

The time-resolved spectroscopy of Rh-6G aqueous solution excited by 400nm photon
Examples

The time-resolved spectroscopy of ALQ:Ce excited by 400nm photon.
The decay time of ALQ:Ce at 520nm emission excited by 400nm photon ($\tau=33.9$ns)
Thank You!
VUV beamline (Seya-Namioka)

Wavelength range: 40-350nm

Resolve power: >500

Flux at sample: \(10^{10}\) ph/s (I=200mA)
VUV Endstation
Specifications of the Imaging Spectrograph

Optical System:
Czerny-Turner type

Focal Length:
275mm

Resolution:
0.1nm with standard 1200g/mm grating, 10μm slit

Focal plane detector compatibility:
provides nominal 592nm coverage with 150g/mm grating, 293nm with 300g/mm grating, 143nm with 600g/mm grating, and 67nm with 1200g/mm grating at 500nm
2D Imaging detector-MCP/RAE
2D Imaging detector-MCP/RAE
Functional Diagram
Position Analyzer
TAC
Single bunch operation