Abstract

Today’s cutting edge research and manufacturing applications in semiconductor, materials and life sciences require light sources capable of delivering highly bright and stable radiation over long lifetimes. Laser-Driven Light Sources (LDSLSTM) were developed to use high power diode lasers to energize high intensity xenon (Xe) plasma. The light sources produce 170nm to 1700nm radiation with ultrahigh brightness and long source life.

LDLS Principle of Operation

Near infrared diode laser beam is focused into a high pressure Xe bulb and a laser optical power sustained high temperature Xe plasma is generated. The plasma emits broad band radiation from 170nm to 1700nm with extremely high radiance (brightness).

Benefits of LDLS Technology

- Very high brightness across complete spectrum
  - 170nm through visible and out to 2100 nm
- Eliminates need for multiple lamps (replaces D2/Tungsten/Xenon Arc)
  - Simplified optical system
  - Excellent Spatial stability
  - Repeatable measurements
  - Superior short and long term power stability
  - Repeatable measurements
  - Electrodeless operation for long life
  - Reduced consumable costs
  - Minimal recalibration of instrument
- Reduced consumable costs
  - Eliminates need for multiple lamps (replaces D2/Tungsten/Xenon Arc)
  - LDLS has higher brightness with ~100 μm diameter Xenon plasma,
  - Superior short and long term power stability
  - Electrodeless operation for long life
  - Excellent Spatial stability
  - Repeatable measurements
  - Minimal recalibration of instrument

Field of Applications

- UV-Vis Spectrometry
- Monochromator Source
- PEEM
- Atomic Absorption Spectroscopy
- Materials Characterization
- Environmental Analysis
- Hyperspectral Imaging
- Gas Phase Measurements
- Advanced UV-Vis Microscopes
- Endoscopes/Borescopes

Summary

- Very high brightness across complete spectrum
  - 170nm through visible and out to 1700 nm
  - Easy coupling to small fibers and spectrometer slits
  - Ease of collimation
  - Eliminates need for multiple lamps (replaces D2/Tungsten/Xenon Arc)
  - Simplified optical system
- Excellent Spatial stability
  - Repeatable measurements
  - Superior short and long term power stability
  - Repeatable measurements
  - Electrodeless operation for long life
  - Reduced consumable costs
  - Minimal recalibration of instrument

EQ-99FC (Fiber Coupled) Spectral Distribution

Energetiq LDLS Products on the Market

Compare Plasmas in an Arc Lamp and in LDLS

Xe Arc-Lamp

- Note: anode glowing red
- Large plasma size
- Brightness
- Arc position instability

LDLS

- Note: anode NOT glowing
- Small plasma size
- High brightness
- Highly stable position

Compare LDLS with Traditional Lamps

Near infrared diode laser beam is focused into a high pressure Xe bulb and a laser optical power sustained high temperature Xe plasma is generated. The plasma emits broad band radiation from 170nm to 1700nm with extremely high radiance (brightness).