

Dr. Muhammad Maqbool's Colloquium Talk

Title:

CONSTRUCTION OF TITANIUM DOPED AlN INFRARED MICROLASER IN WHISPERING GALLERY MODE AND ITS POSSIBLE BIOMEDICAL APPLICATIONS

Abstract:

Microlaser plays an important role in laser technology and applications due to its smaller size. When a lasing material is deposited around an optical fiber, the cylindrical shape of the fiber acts as cavity for laser production. Transition metals and rare-earth elements are good candidates to produce such kind of laser due to their characteristic light emission in all UV, visible and IR regions of the spectrum. Our work reports an infrared laser made out of titanium doped aluminum nitride (AlN:Ti) deposited around an optical fiber. Optical fibers of 12 μm diameter were coated with a sputter-deposited layer (4 μm thick) of titanium (1 at. %)-doped amorphous aluminum nitride. When optically pumped by an Nd:YAG green laser at 532 nm, laser action was observed in whispering gallery modes around the fiber (in a ring shape) at 780.5 nm with a quality factor $Q > 1500$. Other modes were also observed between 775 and 800 nm. The primary and secondary modes give a mode separation of 4.6 nm. No waveguide modes were observed in the cavity. Along with many applications in optics and photonics industry, this laser is very useful in biomedical applications, particularly in Heart Ablation, Cancer detection, and applications in hyperthermia.