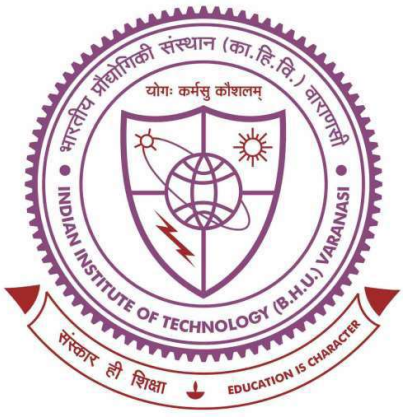
Design and analysis of some surface plasmon resonance based photonic crystal fiber refractive index sensors



Thesis submitted in partial fulfilment for the

Award of Degree

Doctor of Philosophy

in

Physics

by

Umang Ramani

DEPARTMENT OF PHYSICS
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Sincerely

(Umang Ramani)

DEDICATED

TO

MY BELOVED

FAMILY

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Nomenclature

TIR	Total internal reflection
PCF	Photonic crystal fiber
SPW	Surface plasmon wave
SPP	Surface plasmon polariton
SPR	Surface plasmon resonance
PCs	Photonic crystals
EM	Electromagnetic
PBG	Photonic band gap
OFS	Optical fiber sensor
SMF	Single mode fiber
MMF	Multi mode fiber
M – TIR	Modified total internal reflection
FDFD	Finite difference frequency domain
FDTD	Finite difference time domain
FEM	Finite element method
n_{eff}	Effective mode index
n_{core}	Refractive index of core
$n_{cladding}$	Refractive index of core
RF	Radio frequency
β	Propagation constant
SP	Surface plasmon

ATR	Attenuated total reflection
PDE	Partial differential equation
S_λ	Wavelength sensitivity
S_A	Amplitude sensitivity
R	Resolution
TE	Transverse Electric
TM	Transverse Magnetic
Au	Gold
Cu	Copper
Ag	Silver
TiO_2	Titanium di oxide
PML	Perfect match layer
Δn_a	Change in analyte refractive index