

Abdul Nasir K T

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Micro-nano Laser Device Laboratory, Department of Electronics, Kyushu University, Japan

OBJECTIVE

To develop low cost and efficient technologies to advance the life of humanity.

EDUCATION

Program	Institution	Year of completion
PhD in Electrical and Electronics Engineering	Kyushu University, Japan	2018-2021
M S (By research) Laser and optical engineering	Indian Institute of Technology Madras, India	2014-2017
B Tech in Electrical and Electronics Engineering	M G University, India	2009-2013

SCHOLASTIC ACHIEVEMENTS

- Ministry of Human Resources and Development (MHRD) Scholarship for pursuing M S at Indian Institute of Technology Madras.
- JASSO Scholarship for doing research internship at Nagaoka University of Technology, Niigata, Japan.
- JICA Scholarship for pursuing PhD in Japan.

List of papers published

1. **A. Nasir**, Y. Mikami, R. yatabe, H. Yoshioka, N. Vasa, and Y. Oki, "Fully room temperature and label free biosensing based on an ink-jet printed polymer microdisk laser," Opt. Mater. Express 11, 592-602 (2021) [This paper was featured on OSA news release page and received wide media coverage]
2. **A. Nasir**, R. Yatabe, Y. Mikami, H. Yoshioka, N. Vasa, and Y. Oki, "Ink-jet printed, blended polymer-based microdisk resonators for controlling non-specific adsorption of biomolecules," Opt. Lett. 46, 262-265 (2021)
3. **K. T. A. Nasir**, C. Chen, Y. Mikami, T. Takagishi, H. Yoshioka, M. Matsuyama, N. Nishimura, N. J. Vasa and Y. Oki "Lasing characteristics of a pyrromethene597-doped microdisk laser fabricated by the ink-jet printing method" Jpn. J. Appl. Phys. 58, SJJ05 (2019)
4. Lei Wan, Cong Chen, Junfeng Zhu, **K. T. A. Nasir**, Qingyu Cui, Zhenshi Chen, Hiroaki Yoshioka, Weiping Liu, Yuji Oki, and Zhaohui Li, "Changes in optical characteristics induced by polymer blending in printed colloidal quantum dots microlasers," Opt. Express 27, 19615-19623 (2019).

5. R. Selvaraj, **K. T. A. Nasir**, N. J. Vasa, S. S. M. Nagendra, "Monitoring of CO₂ and CH₄ composition in a biogas matrix from different biomass structures," *Sensors and Actuators B: Chemical* 249, 378-385 (2017).

List of conferences attended

1. **A. Nasir**, Y. Mikami, T. Takagishi, R. Yatabe, H. Yoshioka, N. J. Vasa, and Y. Oki, "Fully room temperature bio-sensing using active microdisk fabricated by ink-jet printing method," in *Conference on Lasers and Electro-Optics*, OSA Technical Digest (Optical Society of America, 2020), paper AW3K.5. (Oral presentation)
2. **A. Nasir**, Y. Mikami, T. Takagishi, R. Yatabe, H. Yoshioka, N. Vasa, and Y. Oki, "Effect of Edge Angle of Ink-Jet Printed Microdisk Lasers on Mode Shift Due to Protein Adsorption," in *14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO PR 2020)*, OSA Technical Digest (Optical Society of America, 2020), paper C2D_2. (Oral presentation)
3. **Abdul Nasir K T** ; Mikami, Yuya ; Takagishi, Taku ; Yoshioka, Hiroaki ; Yatabe, Rui ; Vasa, Nilesh J. ; Oki, Yuji. / Mode shift by adsorption of avidin coated on biotinylated microdisk laser printed by ink-jet technique. In: レーザー学会研究会報告 = Reports the on topical meeting of the Laser Society of Japan. 2019 ; Vol. 19, No. 46. pp. 5-9. (Oral presentation)
4. **Nasir K. T Abdul**, Chen Cong, Mikami Yuya, Takagishi Taku, Yoshioka Hiroaki, Nishimura Naoya, Oki Yuji, Lasing characteristics of fluorinated hyper branched polymer based micro disk laser fabricated by ink-jet printing method, 電気関係学会九州支部連合大会講演論文集, 2018, 2018 卷, 平成 30 年度電気・情報関係学会九州支部連合大会 (第 71 回連合大会) 講演論文集, セッション ID 12-2A-03, p. 397, 公開日 (Oral presentation)
5. **K. T. A. Nasir**, N. J. Vasa, and S. Satyanarayanan, "Water Droplet Quantification in Steam Using Absorption Spectroscopy Technique Combined with Light Scattering Technique," in *2017 European Conference on Lasers and Electro-Optics and European Quantum Electronics Conference*, (Optical Society of America, 2017), paper CH_11_4. (Oral presentation)
6. **K. T. A. Nasir**, N. J. Vasa, and S. Satyanarayanan, "Steam Dryness Fraction Measurement Using Mie Scattering and Super Luminescent Diode Based Absorption Spectroscopy," in *13th International Conference on Fiber Optics and Photonics*, OSA Technical Digest (online) (Optical Society of America, 2016), paper Tu4A.3. (Oral presentation)

COURSE WORK

Key courses

M S Course work	B Tech course work
Lasers in measurements and micro manufacturing	Electromagnetic theory
Spectroscopic reactive flow diagnosis	Analog electronics, Digital electronics and Micro processors
Photonics	Control systems
Ultra-fast lasers	Electrical machines
Laser diagnosis in engines	Power systems and transmission lines

SKILLS

Key skills:

Handling of various optical components, lasers, spectrometers etc.

Design of electronic circuits

Trouble shooting of electronic devices

Micro controller programming

Software skills:

MATALAB, COMSOL, FUSION 360, PROTEUS, M S OFFICE

Operating systems: Windows, Linux

Programming languages: C, Python, Arduino

Development boards: Arduino, Raspberry pi

RESEARCH PROJECTS

PhD Projects (In collaboration with Nissan Chemical Corporation)

1. Lasing characteristics of inkjet printed microdisk lasers

Abstract: A newly developed low viscosity hyper branched polymer FC-V-50 was used for the fabrication of microdisk laser by inkjet printing method. Various parameters related to the ink preparation and inkjet printing of microdisk laser were optimized. Compared to the conventional methods such as lithography, the inkjet printing allows the rapid, onsite and room temperature fabrication of microdisk laser. The lasing characteristics of fabricated microdisks were evaluated.

2. Label free biosensing of hyper branched polymer based microdisk laser

Abstract: The FC-V-50 based microdisk laser fabricated by inkjet printing method was used for the label free biosensing of avidin. The FC-V-50 hyperbranched polymer is characterized by carboxyl functional group. Therefore, traditional methods involving high temperature treatments for the biotinylation of microdisk are not needed and the microdisk laser-based biosensor can be fabricated at room temperature in a short time.

3. Controlling nonspecific adsorption of biomolecules using inkjet printed blended polymer microdisk lasers

Abstract: The nonspecific adsorption of biomolecules occurs because of electrostatic and hydrophobic interactions between microdisk surface and biomolecules. This adversely affects the selectivity of the sensor. To solve this issue, microdisk laser was fabricated by blending FC-V-50 and TZ-001 hyper branched polymers. The FC-V-50 has negative charge due to carboxyl functional group and TZ-001 has positive surface charge due to amine functional group. Therefore, by mixing the two polymers in different ratios, the surface charge and hence the nonspecific adsorption due to electrostatic interactions can be controlled. The UV exposure of microdisk make the surface hydrophilic and hence prevent nonspecific adsorption due to hydrophobic interactions.

M S Projects

1. Steam dryness fraction measurement using absorption spectroscopy and Mie scattering (In collaboration with Forbes Marshall Pvt Ltd, Pune, India)

Abstract: Broad band light emitting sources (Super luminescent LED) in 1260 nm – 1360 nm range and 800 - 860 nm range were used for the quantification of water and water vapor in steam based on Mie scattering and absorption spectroscopy respectively. The water droplet size was measured using

SLEDs based on Mie scattering and the droplet size measurement was used for the quantification of water. The absorption line of water vapor at 1348 nm was used for the quantification of water vapor.

2. Monitoring composition in a biogas matrix using super luminescent based absorption spectroscopy.

Abstract: The super luminescent diode (SLED) in 1540 nm–1640 nm range was used for the simultaneous detection and quantification of methane (CH₄) and carbon dioxide (CO₂) in biogas. Absorption lines of CO₂ at 1570 nm and CH₄ at 1600 nm were used for quantification. The incorporation of etalon in the measurement setup permits the use of low-resolution spectrometer for onsite measurements.

B Tech Projects

1. Power line inspection system

Abstract: Cracks on power transmission lines was detected by monitoring temperature variation on power line. This is based on resistance variation across crack and ohmic loss associated with it.

2. Cell phone based remote controller for water pump.

Abstract: Water pumps installed in remote agricultural fields for irrigation purpose was operated using a cell phone based remote controller. A low-cost technique was developed based on DTMF decoder and a cell phone.

3. Temperature based fan speed controller

Abstract: An automatic fan speed controller that automatically adjusts fan speed according to ambient temperature was developed. This can be used for controlling ceiling fan speed and cooling electronic devices.

JOB HISTORY

1. Academic researcher at micro/nano laser devices laboratory, ISEE, Kyushu University (2021-05-01 to Present).

Working on silicon nitride based distributed feedback microring laser. Single mode lasing of distributed feedback microring laser was achieved. Effect of various device parameters on lasing performance was investigated.

DICLARATION

I hereby declare that the above information is true with my knowledge.

Date: 02/11/2021

(Abdul Nasir K T)

Place: Fukuoka, Japan