

Purpose of publication

This publication is being created to widely introduce the achievements of research and development activities conducted by Nikon Corporation. This is a result of R&D based on Nikon's core technologies of "opto-electronics" and "precision" technologies that have been incorporated in new products and/or often valued by external organizations such as academic societies.

Foreword



Senior Executive Vice President
CTO, Deputy CFO

Yasuhiro Ohmura

Due to ongoing changes in the natural and social environments, our surroundings are evolving every day, presenting us with new challenges. In order to contribute to a sustainable society through business even in such circumstances, we'd like to more deeply understand the essence of what our customers want and collaborate with them to develop solutions that fuel their innovations.

We have passed the halfway mark of our Medium-Term Management Plan that was formulated to realize our Vision 2030 – transforming into “a key technology solutions company in a global society where humans and machines co-create seamlessly”. We need to continue to advance technological innovations that underpin our value proposition, so that we can grow further in line with the plan and consistently meet the evolving expectations of society and our customers in the eras to come.

Executive Fellow
General Manager of Advanced Technology
Research & Development

Masaaki Doi



I'm pleased to present this year's report showcasing the Nikon Group's achievements in research and development. From Digital Manufacturing, which is a strategic business domain in the Medium-Term Management Plan, this report highlights that Nikon SLM Solutions AG – a new member of the Group – has developed an industry-leading, large-scale and high-speed metal 3D printer. Also featured from this domain is riblet technology – a type of biomimetic technology that imitates shark skin structure – applied to wind power generation to help realize a sustainable society. From the Healthcare Business, a digital microscopy technology that supports drug discovery and pathological diagnosis is featured. From the Imaging Business, which is one of our main businesses, we report on a super-telephoto prime lens with a built-in teleconverter featuring a slew of state-of-the-art technologies. You will also find exciting articles about light sources for future space optical communications and fundamental materials technology.

While this report represents just a fraction of the extensive technological developments within the Nikon Group, I hope that it provides an insightful glimpse into our R&D activities and opens up opportunities for our technology to contribute to a better society and environment.

Nikon Research Report Vol.6

目次／CONTENTS

技術解説/Technical Reports

- 1 PBF 式 Additive Manufacturing 装置 NXG 600E の開発
Sebastian Feist, Daniel Brück, Christoph Wangenheim
Development of PBF Additive Manufacturing Machine NXG 600E
Sebastian FEIST, Daniel BRÜCK and Christoph WANGENHEIM
- 11 ニコン [NIKKOR Z 400mm f/2.8 TC VR S] [NIKKOR Z 600mm f/4 TC VR S] の開発
猪原祐治, 山下雅史, 坂本祐輔
Development of the 'NIKKOR Z 400mm f/2.8 TC VR S' 'NIKKOR Z 600mm f/4 TC VR S'
Yuji IHARA, Masashi YAMASHITA and Yusuke SAKAMOTO
- 18 デジタル倒立顕微鏡に搭載した HCA 用アプリケーションの技術と実施例の紹介
林 耕磨, 門井宏平, 柴田美智太郎, 大井宏美, 星野哲朗
Introduction of HCA Application Technology and Examples Installed on Digital Inverted Microscopes
Kohma HAYASHI, Kohei KADOI, Michitaro SHIBATA, Hiromi OI and Tetsuro HOSHINO
- 25 デジタル正立顕微鏡を用いた複数免疫染色標本の位置合わせ機能の開発
森山真樹, 佐藤慎哉, 渡邊博忠, 山浦遼平, 森屋健太郎, 古田伸一, 荻田 聡, 平尾大介, 中田千枝子
Position Alignment Function Development of Multiple Immunostained Specimens using a Digital Imaging Microscope
Masaki MORIYAMA, Shinya SATO, Hirotsuda WATANABE, Ryohei YAMAURA, Kentaro MORIYA, Shinichi FURUTA, Satoshi KANDA, Daisuke HIRAO and Chieko NAKADA

研究開発論文/Research and Development Reports

- 31 風車翼型へのリブレット適用による揚力改善効果検証
柳瀬菜穂, 東野嵩也, 倉島高広, 土橋晋太郎, 久保徳嗣, 田中元史
Verification of Lift Improvement by Applying Riblets to Airfoil for Wind Turbines
Naho YANASE, Takaya HIGASHINO, Takahiro KURASHIMA, Shintaro TSUCHIHASHI, Noritsugu KUBO and Motofumi TANAKA
- 36 宇宙空間光通信用 連続波単一横モード偏波保持 10 W Er/Yb 共添加ファイバー増幅器の開発
小林啓紀, 狩野良子, 瀬尾崇志, 鈴木康史, 水田栄一, 橋本洋輔, 荒木智宏, 高田康利
Development of a Continuous Wave Single Transverse Mode Polarization-Maintaining 10 W Er/Yb-Codoped Fiber Amplifier for Space Communications
Hiroki KOBAYASHI, Ryoko KANO, Takashi SEO, Yasushi SUZUKI, Eiichi MIZUTA, Yosuke HASHIMOTO, Tomohiro ARAKI and Yasutoshi TAKADA

46

高性能反射防止膜 “メソアモルファスコート” 用超低屈折率多孔質シリカ薄膜の作製

鈴木涼子

Fabrication of a Porous SiO₂ Thin Film with an Ultralow Refractive Index for High Performance Anti-reflective Coatings “Meso Amorphous Coat”

Ryoko SUZUKI

54

フッ化物リン酸塩ガラスの光学特性と局所構造に対する O/P 比の寄与

吉本幸平, 上田 基, 山本優也, 水口雅史

Impact of the O/P Ratio on the Optical Properties and Structures of Fluoride-Phosphate Glass

Kohei YOSHIMOTO, Motoi UEDA, Yuya YAMAMOTO and Masafumi MIZUGUCHI