III-Nitride Semiconductors
Patent Landscape
Statistical review of new patent applications published in 2012-2013
April 2013

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# Table of Contents

## Terminologies for Patent Analysis
- Substrate 30
  - Table of Contents 3
  - Geographical Breakdown of Patent Filings 31
  - Main Patent Applicants 32
  - Main Inventors 33
  - Main Academic Patent Applicants 34
  - Legal Status of Patent Filings 35
  - Countries of Filings for Main Patent Applicants 36
  - Patent Applicant IP Network 37
  - Patent Applicant/Inventor IP Network 38
  - Main IPC Classes 39

## Objectives and Methodology
- Power 40
  - Table of Contents 5
  - Geographic Breakdown of Patent Filings 41
  - Main Patent Applicants 42
  - Main Inventors 43
  - Main Academic Patent Applicants 44
  - Legal Status of Patent Filings 45
  - Countries of Filings for Main Patent Applicants 46
  - Patent Applicant IP Network 47
  - Patent Applicant/Inventor IP Network 48
  - Main IPC Classes 49

## Executive Summary
- Technology Breakdown of Patent Filings 19
- Table of Contents 6
- Geographic Breakdown of Patent Filings 20
- Main Patent Applicants 21
- Main Inventors 22
- Main Academic Patent Applicants 23
- Legal Status of Patent Filings 24
- Countries of Filings for Main Patent Applicants 25
- Patent Applicant IP Network 26
- Patent Applicant/Inventor IP Network 27
- Main IPC Classes 28

## Companies Mentioned in This Report
- Available Technologies 50
- Table of Contents 7
- Geographic Breakdown of Patent Filings 21
- Main Patent Applicants 22
- Main Inventors 23
- Main Academic Patent Applicants 24
- Legal Status of Patent Filings 25
- Countries of Filings for Main Patent Applicants 26
- Patent Applicant IP Network 27
- Patent Applicant/Inventor IP Network 28
- Main IPC Classes 29

## Patent Landscape Overview
- Light Emitting Diodes (LED) 20
- Table of Contents 8
- Geographic Breakdown of Patent Filings 21
- Main Patent Applicants 22
- Main Inventors 23
- Main Academic Patent Applicants 24
- Legal Status of Patent Filings 25
- Countries of Filings for Main Patent Applicants 26
- Patent Applicant IP Network 27
- Patent Applicant/Inventor IP Network 28
- Main IPC Classes 29

## Substrate
- Substrate 30
  - Method for ammonothermal growth of highly pure group-III nitrides 30
  - Use of flux method to grow seed crystals for ammonothermal growth of group-III nitride crystal growth 31
  - Current aperture vertical electron transistor (CAVET) for high power applications 32
  - High efficiency group-III nitride/non-group-III nitride tandem solar cells 33
  - Defect reduction of non-polar and semi-polar III-nitrides 34
  - Method for producing GaN substrates for electronic and optoelectronic device 35
  - MOCVD growth of planar non-polar m-plane gallium nitride 36
  - Non-phase separated InGaN for use in light-emitting diodes, lasers, and solar cells 37

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Objectives and Methodology

Objectives
This IP report is focused on group III nitride compound semiconductors (GaN, AlN, InN and their alloys). It provides a statistical analysis of new patent applications published the last 12 months (from April 2012 to March 2013).

This IP report includes:
✓ A patent landscape overview with technological segmentation (LED, Laser, Power, RF, Substrate ...)
✓ A presentation of relevant new patents for sale or license.
✓ An Excel database of all the analysed patents, with technological segmentation, and allowing for multi-criteria searching.

Methodology
• The data was extracted from the FamPat worldwide database (Questel-ORBIT) which provides 60+ million patent documents from 95 offices.
• 1,574 relevant patent families have been selected. The selection of patents has been done both automatically and manually.
• The statistical analysis was performed with INTELLIXIR System.
• The patents were categorized using keyword analysis of patent title, abstract and claims, in conjunction with expert review of the subject-matter of inventions:
  - Substrate (bulk crystal growth, freestanding, slicing, finishing ...)
  - Epi-wafer (crystal growth, epitaxial structures, defect reduction, stress management, doping ...)
  - LED
  - Laser
  - Power Devices (Schottky diodes, switching devices, rectifiers ...)
  - RF & Advanced Electronics (HEMT, HFET, MOSFET, THz, RTD ...)
  - Photovoltaics
  - Sensors (UV detectors, MEMS, biosensors ...)

Searches for patents were conducted early April 2013 hence patents published/granted after this date will not be available in this deliverable.
The patents were grouped according FamPat’s family rules (variation of EPO strict family): A Patent Family comprises patents linked by exactly same priority numbers (strict family), plus comparison of priority and application numbers, specific rules by country and information gathered from other sources (national files, legal status ...)

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Executive Summary

Group III nitride semiconductors are recognized as having great potential for short wave length emission (LEDs, LDs, UV detectors) and high-temperature electronics devices. The field of III-N semiconductors has shown an intensive patenting activity since early 1990s, with a substantial increase during the past decade. Today, there are more than 27,000 patent families filed all over the world. The most active companies are Panasonic, Toshiba, Samsung, Sumitomo and Hitachi. The patents related to LED technology account for more than 40% of filings, followed by those related to GaN substrates (<20%), Power Devices (<15%), Epi-wafers (<10%), Laser (>5%) and RF & Advanced Electronics (<5%).

More than 1,570 new patent families were published between early April 2012 and late March 2013. They were filed by about 350 patent applicants mainly located in Japan, Korea, USA and China. The main patent applicants are Sumitomo, Toshiba, Samsung, Sharp and Mitsubishi which represent together almost 25% of the patents published the last 12 months. The academic organisms account for almost 15% of new patent filings and they are mainly located in China. The data set was segmented by type of application (Substrates, Epi-wafers, LED & Laser, Power Devices, RF & Advanced Electronics, Photovoltaics, Sensors-Detectors-MEMS). About 45% of new patent families published the last 12 months are related to LED technology. They were mainly filed by Toshiba, LG and Samsung, while Chinese companies are increasing their patent activity (Tongfang, Sanan Optoelectronics). The patents claiming an invention related to III-N Substrates and Power Devices represent 20% and 14% of new filings respectively. The patents dedicated to Substrate technology were mainly filed by Sumitomo, Hitachi and Mitsubishi, while University of California and Soitec filed 15 and 8 new patents respectively. The patents dedicated to Power Devices were mainly filed by Advanced Power Device Research Association, Samsung and Sumitomo, and the patent filings remain dominated by Japanese companies. Numerous patent applications published this year are offered for sale or for license. This year, the most relevant offers are the ones from the University of California (e.g. Ammonothermal growth technique, CAVET for High Power Application, Defect reduction of semi-polar III-N, GaN substrates, III-N tandem solar cells ...).
Sample Pages

Main Patent Applicants

Countries of Filings for Main Patent Applicants

Patent Applicant IP Network

Backward Citations Map

Technology Breakdown of Patent Filings

Patent Applicant/Inventor IP Network

Legal Status of Patent Filings

Main IPC Classes

Available Technology

III-Nitride Semiconductors - Patent Landscape - April 2013
Order Form

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Terms and Conditions of Sales

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IBAN: FR76 1560 7000 6360 6214 5695 126
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