Santosh Kumar currently works as Principal Analyst and Director of Packaging, Assembly and Substrates for Yole Korea. Based in Seoul, Santosh is involved in the market, technology, and strategic analysis of microelectronic assembly and packaging technologies. His main area of interest is advanced IC packaging technology, including equipment and materials. He has authored several reports on fan-out / fan-in WLP, flip chip, and 3D/2.5D packaging.

Santosh received a bachelor’s and master’s degree in Engineering from the Indian Institute of Technology (IIT), Roorkee and the University of Seoul, respectively. He has published more than 40 papers in peer-reviewed journals and has obtained two patents. Moreover, Santosh has presented and given talks at numerous conferences and technical symposiums related to advanced microelectronics packaging.

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Vaibhav Trivedi is a Senior Technology & Market analyst at Yole Développement (Yole) working with the Semiconductor & Software division. Based in the US, he is a member of Yole’s advanced packaging team and contributes to analysis of ever-changing advanced packaging technologies. Vaibhav has 17+ years of field experience in semiconductor processing and semiconductor supply chain, specifically on memory and thermal component sourcing and advanced packaging such as SiP and WLP.

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Favier Shoo is a Technology and Market Analyst in the Semiconductor and Software division at Yole Développement (Yole), part of Yole Group of Companies. Based in Singapore, he is engaged in the development of reports as well as the production of custom consulting projects. With prior experience at Applied Materials and REC Solar, Favier has developed a deep understanding of the supply chain and core business values. Being knowledgeable in this field, Favier has conducted professional training for industry players and obtained two patents. He also co-founded a startup company. Favier holds a bachelor’s in Materials Engineering (Hons) and a minor in Entrepreneurship from Nanyang Technological University (NTU) (Singapore).

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  o WLCSP demand details

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  o Shipments – historical & forecast
  o Supplier market shares (OSAT/Foundry)
  o WLCSP ASP per markets & size
  o Near-term shipment & pricing outlook
  o Capex & capacity

WLCSP Package supply
  o WLCSP production by supplier
  o WLCSP production by technology
  o WLCSP device/application mix

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  o SAMSUNG Electronics
  o ASE
  o JCET
  o AMKOR
  o SPIL
  o NEPES/DECA
  o China WLCSP
  o Huatian
  o TI
  o others

FO package supply
  o FOWLP production by supplier
  o FOWLP production by technology
  o FOWLP device/application mix

FO Package demand
  o System demand overview
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FO Package supplier details
  o TSMC
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FOWLP & FOPLP market overview
  o FOWLP/FOPLP market dynamics – summary
  o Revenue – historical & forecast
  o Shipments – historical & forecast
  o Supplier market shares (OSAT/FOUNDRY)
  o FOWLP ASP per markets & size
  o Near-term shipment & pricing outlook
  o Capex & capacity
COMPANIES MONITORED IN THE PRODUCT

Amkor, ASE, Deca, Huatian, JCET, Nepes, PTI, Samsung Electronics, Semco, SPIL, TSMC, TI, China WLCSP
Advanced Packaging Monitor

Module I

Fan out Package Monitor (Wafer & Panel Level)

2019 Q4 released

Module II

WLCSP / Fan-In Package Monitor

2020 Q1

Module III

FC (fcCSP / FCBGA/ SiP / 2.5-3D / PoP)

2020 Q4

Publication Date
# ADVANCED PACKAGING MONITOR METHODOLOGY

## Top-down approach

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<thead>
<tr>
<th>Mobile/Consumer etc. Markets</th>
<th>End systems/Phones/Wearables</th>
<th>Device such as PMIC/SoC etc.</th>
<th>Package Type</th>
<th># of Die, components, Package Construction</th>
<th># of Wafers</th>
<th>OSAT/Foundry Suppliers</th>
<th>Supplier market share per package</th>
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<tbody>
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<td>Telecom &amp; Infrastructure</td>
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## Bottom-up approach
The main objectives of this monitor are the following:

- Near-term market dynamics on quarterly basis
- Long-term market dynamics for 2020-2025
- CapEx per major players
- Market share of major OSAT/Foundry players
- Package ASP per given market/platform
- Device/application adoption for fan-out packaging technologies

The Fan-Out markets are studied from the following angles:

- Supply and demand
- End-user applications and key growth drivers/areas
- Process technologies
- Device application Mix
- Production, CapEx, Revenue and Package ASP
WHO SHOULD BE INTERESTED IN THIS MONITOR

**Equipment & material suppliers:**
- To identify new business opportunities and prospects
- To understand the differentiated value of your products and technologies
- To identify technology trends, challenges and precise requirements
- To evaluate your Advanced Packaging technologies’ market potential
- To position your company in the market
- To monitor and benchmark your competitors

**Financial & strategic investors:**
- To identify new business opportunities and prospects
- To understand the market potential of Advanced Packaging
- To understand which players will benefit from Advanced Packaging adoption
- To understand the players that are investing in the Advanced Packaging business

**OSATs, IDMs & foundries:**
- To understand technology trends related to Advanced Packaging platforms
- To spot new opportunities and define diversification strategies
- To understand the overall Advanced Packaging market
- To monitor and benchmark potential competitors
- To understand the supply chains involved in Advanced Packaging

**OEMs & integrators:**
- To understand technology trends in Advanced Packaging platforms
- To spot new opportunities and define diversification strategies
- To understand the overall Advanced Packaging market
- To monitor and benchmark potential competitors
- To understand the supply chains including the equipment / material suppliers

**R&D organizations:**
- To evaluate the potential of future technologies and products
- Identify market needs for new applications
- To understand the bottle necks of the Advanced Packaging technology and direct their resources to solve the technical issues
- To identify the best candidates for technology transfers
- To identify the partners for consortia
WLCSP & FAN-OUT PACKAGE MARKET DYNAMICS PER PLAYER (WAFERS & UNITS)

WLCSP Package Production per Supplier (Mu)

FO 300 mm Reconstituted wafer Production (K wafers)
WLCSP REVENUE

- Mobile & Consumer
- Automotive
- Telecom & Infrastructure

Revenue ($M)

- 2015
- 2016
- 2017
- 2018
- Q1-19
- Q2-19
- Q3-19
- Q4-19
## FAN-IN / WLCSP Advanced Packaging Quarterly Market Monitor Q1 2020

**Overview data**
- WLCSP Market Forecast
- WLCSP Supply Demand
- WLP CapEx
- WLCSP Market share
- WLCSP ASP

**Demand data**
- System Demand
- WLCSP Demand

**Production data**
- WLCSP Process Technology
- WLCSP Production
- WLCSP Application Mix

## FOWLP & FOPLP Advanced Packaging Quarterly Market Monitor Q1 2020

**Overview data**
- FO Package market forecast
- Supply and demand
- FO Package Capex
- FO Package Market share
- FO Package ASP

**Demand data**
- System Demand
- FO Package Demand

**Production data**
- FO Package Technology Mix
- FO Package Production
- FO Package Application Mix
## WLP MONITOR CONTENT: WLCSP & FO REVENUE PER PLAYER

### WLCSP revenue and market share

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### FO Package market forecast

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From module technical content to market forecast and market shares

**Advanced Packaging Quarterly Market Monitor**
- Packaging Service

**Consumer**
- Smartphones,
- Smart Homes, Wearables

**Market Monitors**
by Yole Développement
- Market shares evaluation
- Market and technology forecasts

**Teardown Tracks**
by System Plus Consulting
- Design win identification
- Technology assessment

**Application Processor Quarterly Market Monitor**
- Computing Service

**Automotive**
- ADAS, Infotainment, Connectivity

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and System Plus Consulting:
with our products, get a deep understanding on the technology, market and trends of the semiconductor industry.
YOLE GROUP OF COMPANIES RELATED REPORTS

Yole Développement

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Fan-Out Packaging: Technologies and Market Trends 2019

Equipment and Materials for Fan-Out Packaging 2019
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