



# SILVER: THE METAL OF OPPORTUNITIES

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SUDHEESH NAMBIATH

Senior Analyst, Precious Metals Demand

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# SILVER SUPPLY & DEMAND

(tonnes)	2013	2014	+(-)	%
<b>Mine Supply</b>	<b>25,981</b>	<b>27,293</b>	1,312	5.0%
Net Government Sales	245	-	-	-
Scrap	5,993	5,242	(751)	-12.5%
Net Hedging Supply	(1,102)	492	1,594	-144.6%
<b>Total Supply</b>	<b>31,118</b>	<b>33,027</b>	1,909	6.1%
Jewelry	6,597	6,693	96	1.5%
Coins & Bars	7,577	6,095	(1,482)	-19.6%
Silverware	1,830	1,887	57	3.1%
Industrial Fabrication	18,596	18,504	(92)	-0.5%
...of which Electrical & Electronics	8,281	8,209	(72)	-0.9%
...of which Brazing Alloys & Solders	1,963	2,056	93	4.7%
...of which Photovoltaic	1,736	1,862	126	7.3%
...of which Photography	1,493	1,419	(74)	-5.0%
...of which Other Industrial	5,122	4,958	(164)	-3.2%
<b>Physical Demand</b>	<b>34,599</b>	<b>33,179</b>	(1,420)	-4.1%
<b>Physical Surplus/ Deficit</b>	<b>(3,481)</b>	<b>(152)</b>		



# WORLD SILVER SURVEY 2015

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The complete report can be downloaded from

- [www.forms.thomsonreuters.com](http://www.forms.thomsonreuters.com)
- The Silver Institute



## Opportunities and challenges in supply

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- Silver refined in India
  - Concentrates
  - Dore bars
- Considering gold dore into bulk import license
- Scrap market
- Challenges in pricing of silver for industrial users due to longer cycles and the need to fix raw material cost in advance
- Need for regulations to evolve for considering bringing metal pool account / unallocated account
- Silver metal loan similar to gold metal loan



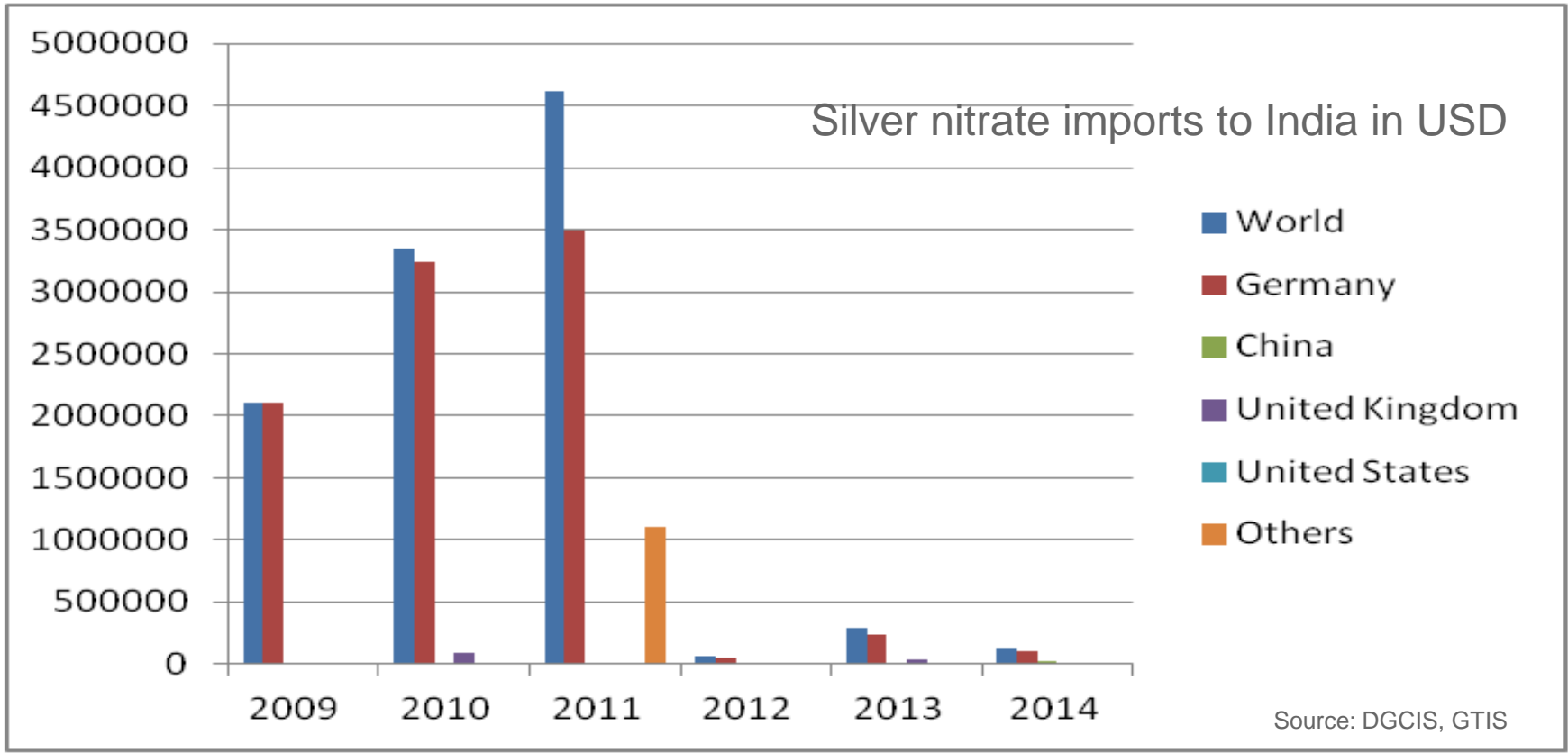
## Usage in industrial segment

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- Industrial usage has increased from 915 tonnes in 2005 to 1470 tonnes in 2014
- Soldering and Brazing industry consumption has grown from 75 to 82 tonnes
- Electrical and electronics industry excluding the plating has grown from 718 tonnes to 813 tonnes
- Pharmacy and chemical catalyst, foils and food, jari materials, decoratives all together has increased from 838 tonnes to 857 tonnes



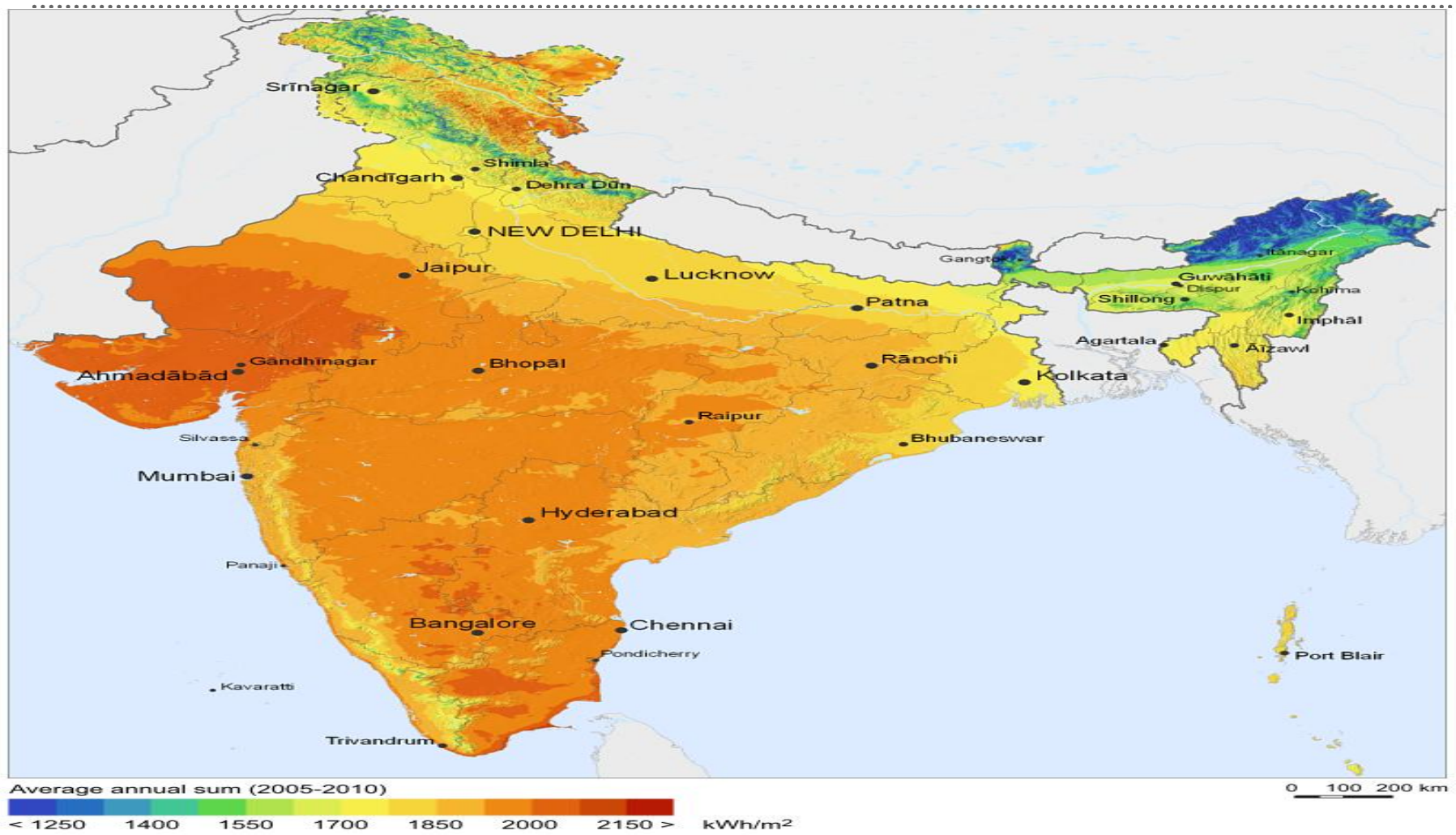
# Silver Nitrate Market- A case of India's capability



- Reducing dependence on imported silver nitrate, imports have fallen from \$2.1 million to \$0.1 million
- However exports has not increased due to pricing disadvantage



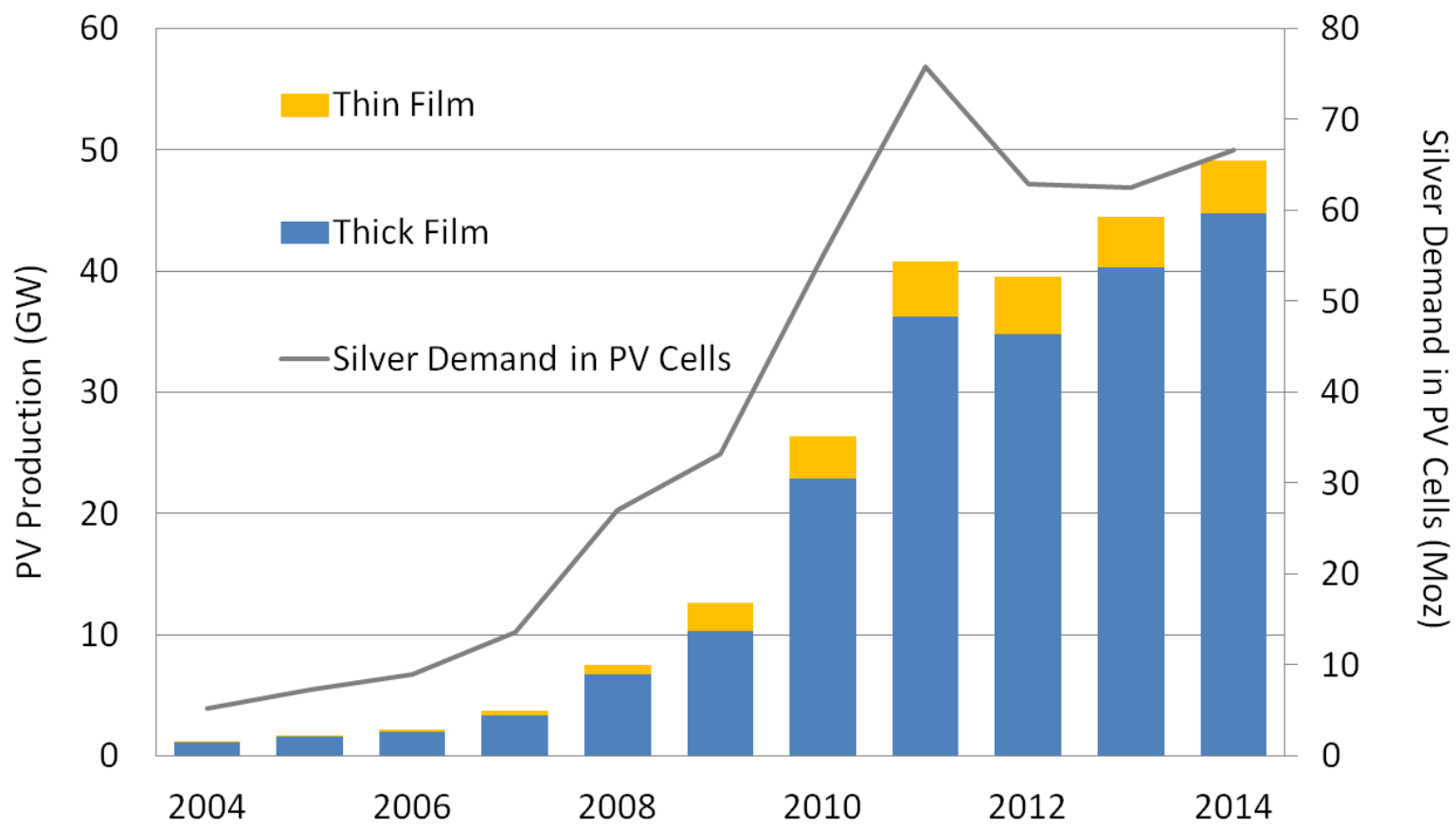
# India's solar resource





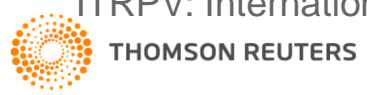
# Silver Powder/Paste in Photovoltaics Applications

Projected through 2016



Source: GFMS, Thomson Reuters; ITRPV, Solarbuzz, Earth Policy Institute

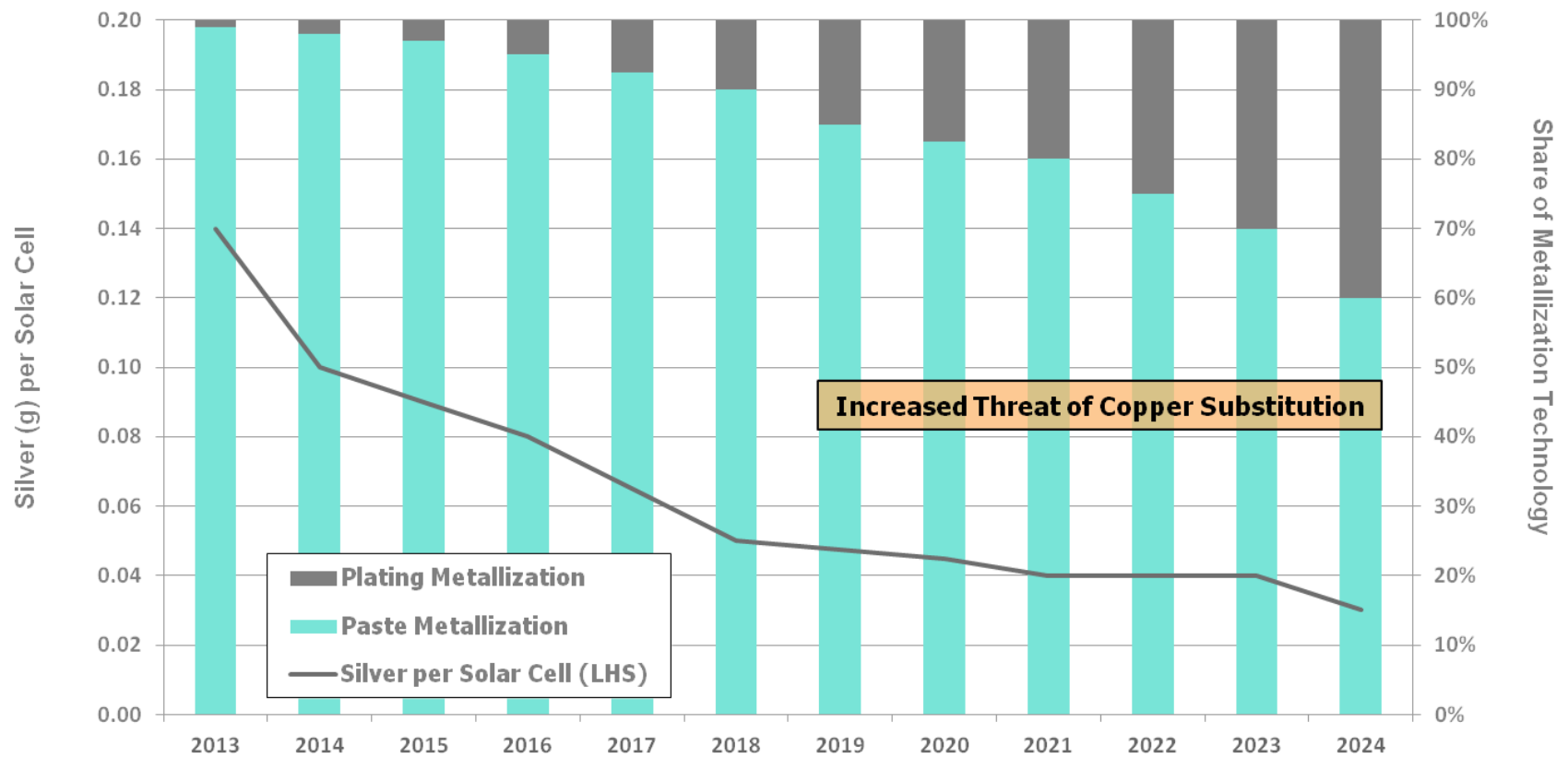
ITRPV: International Technology Roadmap for Photovoltaic





# Silver's Future Role in Solar Cells

**Thrifting of Silver in Solar Cells and Metallization Technology Breakdown**

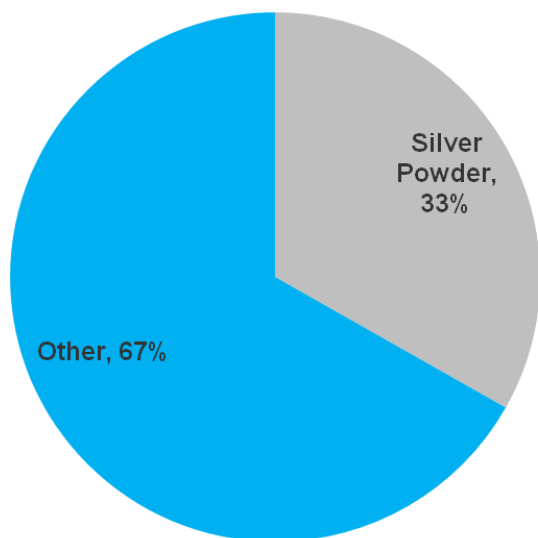


Sources: ITRPV; GFMS, Thomson Reuters



# Silver Powder-Based Antimicrobial Coatings

**Antimicrobial Coatings Market, 2013**  
*\$1.5 - 2 bln*



Source: Grand View Research; GFMS, Thomson Reuters

- Antimicrobial Coatings Market is expected to grow at a double-digit pace over the next 5 – 10 years. **Silver-based coatings are expected to grow at a faster rate.**
- Silver's dominant use is owed to its extensive use for medical devices and textiles
- Major companies producing silver-based antimicrobial coatings:
  1. BASF
  2. PPG Industries
  3. DuPont
  4. Dow Microbial Control
- North America is largest regional producer of antimicrobial coatings, ~40%
- **Current silver offtake from this market is estimated between 3 – 10 Moz.\* i.e 90 to 310 tonnes**

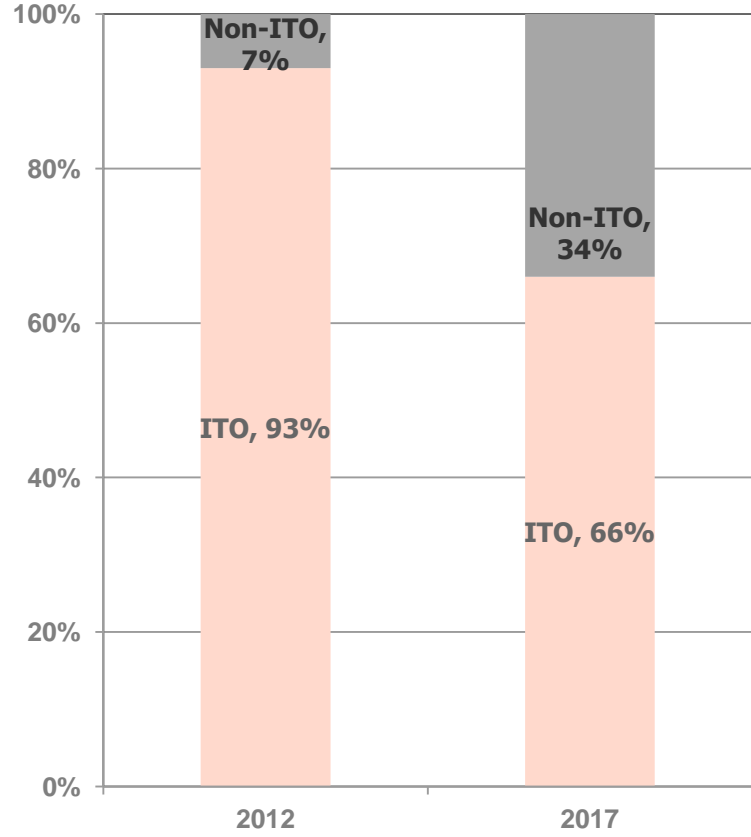
\*Assumes between a 100% and 600% markup over silver contained value.



# Silver Nanomaterials in Transparent Conductors

- Transparent Conductors Definition
- A layer of conductive and transparent material which allows light from an underlying display to pass through it.
- Major Transparent Conductor Film Applications
  1. LCD Displays
  2. Photovoltaics
  3. Touch sensors
- **Silver could, to an extent, displace Indium Tin Oxide, the traditional material used in transparent conductors, particularly for touch screen applications**
- *Transparent conductors made of silver nanomaterials is expected to generate \$225 mln in revenues by 2019 from a negligible level a present. – NanoMarkets*

**Transparent Conductor Films Market**

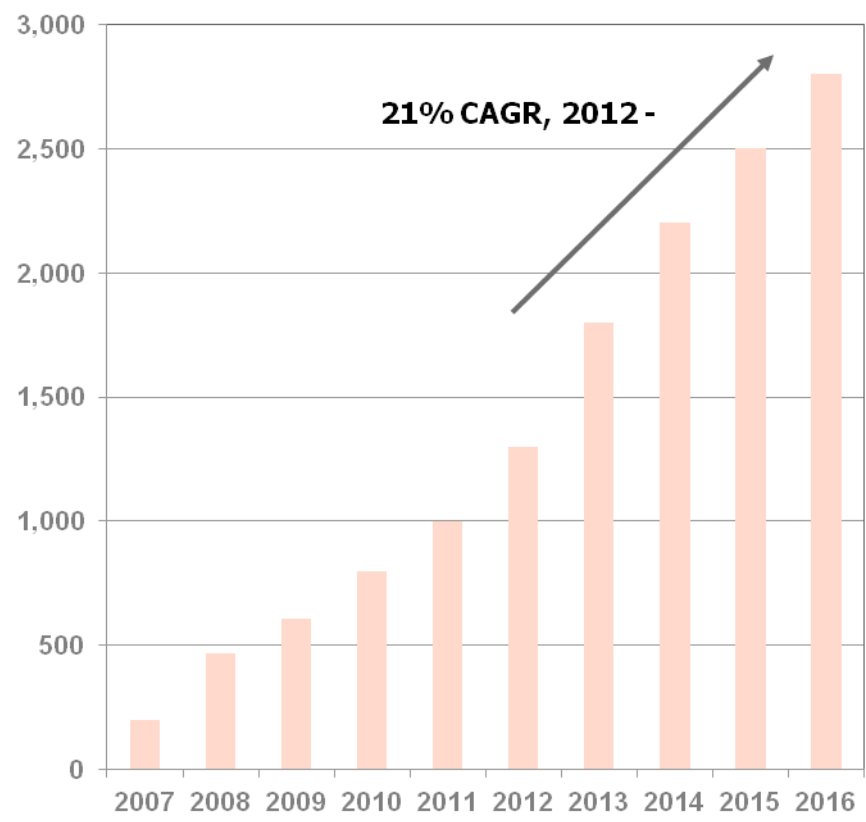


Source: IDTechEx, Note: ITO = Indium Tin Oxide



# Transparent Conductors in Touchscreens

## Touchscreen Module Shipments

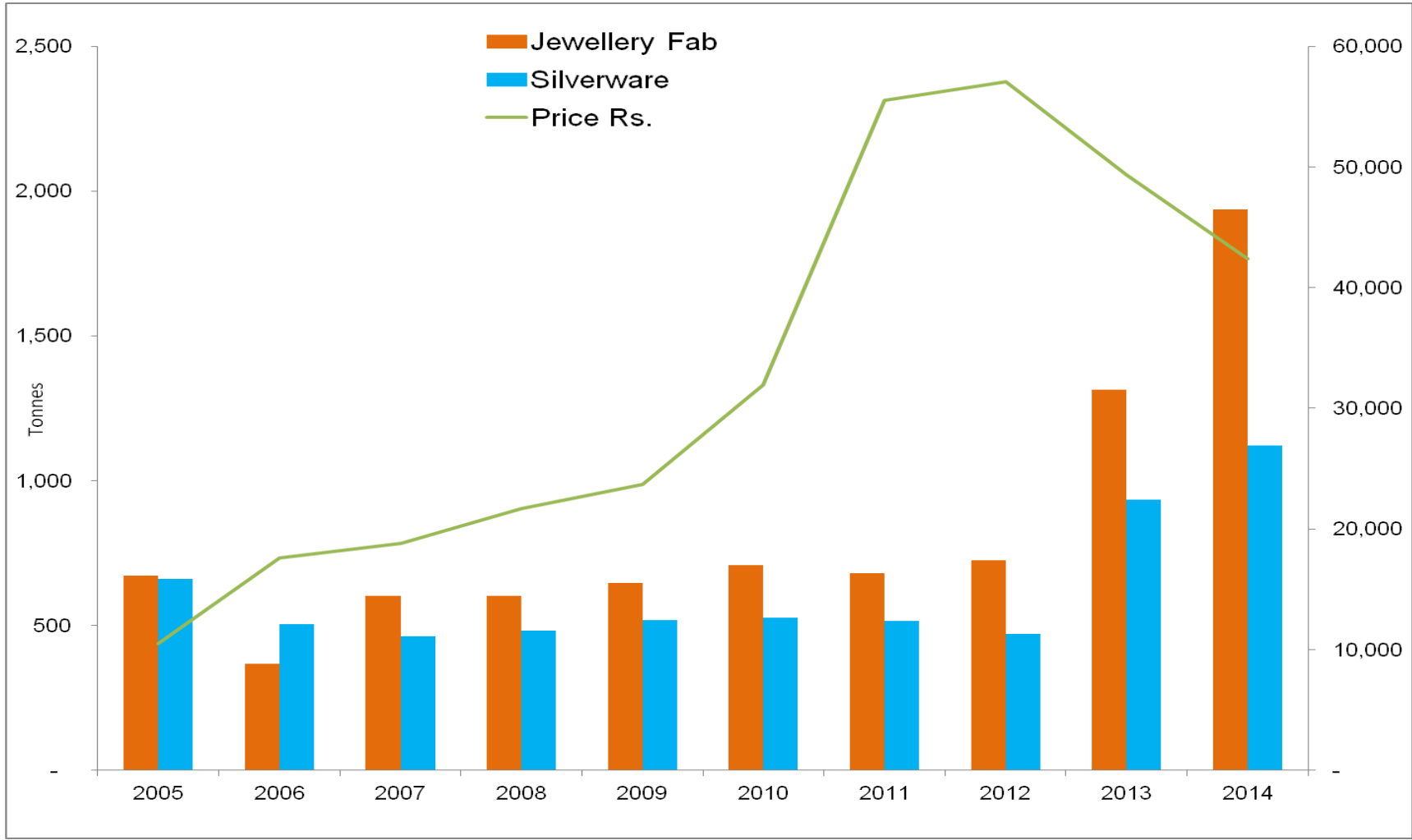


Sources: DisplaySearch, media sources

- Key companies focusing on silver-based transparent conductors, particularly for the touchscreen market:
  1. Cambrios
  2. Kodak & Kingsbury
  3. Carestream
  4. 3M
  5. Sumitomo
- Silver nanowire has compelling potential to displace Indium-Tin-Oxide in transparent conductors in touchscreen segment
  - Added benefit of antimicrobial properties



# INDIA JEWELRY AND SILVERWARE FABRICATION





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