



# Novel Processing Method for Group III-V Semiconductor Surfaces

Tech ID: 24867 / UC Case 2014-816-0

## BRIEF DESCRIPTION

A processing method for group III-V semiconductor surfaces prior to high-dielectric constant dielectric deposition by atomic layer deposition (ALD) or another deposition method.

## BACKGROUND

Complementary metal-oxide-semiconductor (CMOS) is a technology for developing integrated semiconductors and transistors that amplify or switch electrical signals. CMOS transistors have been using silicon channels that limit capacitance density and induce high-voltage leaks. Group III-V compounds are semiconducting materials that feature higher carrier mobilities, increased capacitance density, and less voltage leakage than silicon channels.

## DESCRIPTION

Researchers at UC Santa Barbara have developed a processing method for group III-V semiconductor surfaces prior to high-dielectric constant dielectric deposition by atomic layer deposition (ALD) or another deposition method. The method exposes the III-V surface to alternating or repeated cycles of a remote or direct plasma, which may be a plasma of nitrogen or hydrogen or another gas, or a mixture of such gases, and a titanium precursor. This provides the low defect densities and extremely high capacitance densities without reaching limitations posed by high leakage currents.

## ADVANTAGES

- ▶ Extremely high capacitance density
- ▶ Reduces high leakage currents
- ▶ Low defect densities

## APPLICATIONS

- ▶ Semiconductors
- ▶ Transistors

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,190,266	11/17/2015	2014-816

## CONTACT

Donna M. Cyr  
[cyr@tia.ucsb.edu](mailto:cyr@tia.ucsb.edu)  
tel: .

## INVENTORS

- ▶ Chobpattana, Varistha
- ▶ Stemmer, Susanne

## OTHER INFORMATION

### KEYWORDS

group III-V, semiconductors,  
  
transistors

### CATEGORIZED AS

- ▶ **Semiconductors**
- ▶ Processing and  
Production

### RELATED CASES

2014-816-0

University of California, Santa Barbara  
Office of Technology & Industry Alliances  
342 Lagoon Road, ,Santa Barbara,CA 93106-2055 |  
<https://www.tia.ucsb.edu>  
Tel: 805-893-2073 | Fax: 805.893.5236 | [padilla@tia.ucsb.edu](mailto:padilla@tia.ucsb.edu)



© 2015 - 2016, The Regents of the University of California  
[Terms of use](#)  
[Privacy Notice](#)