



# Nanotechnology

## Program Report For Greater South Bay and Peninsula Region (Santa Clara and San Mateo Counties)

November 2016

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## Nanotechnology

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CIP 2010: A program that prepares individuals to apply mathematical, scientific, and engineering principles and technical skills to manipulate matter at the atomic and molecular level (in the range of 1-100 nanometers) and to design, fabricate, and integrate nanoscale structures, devices, and systems. Includes instruction in materials science, thermodynamics, nanomaterials, nanoelectronics, and nano/micro device fabrication and testing.

## Target Occupations‡

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Engineers, All Other (17-2199)

‡Based on EMSI crosswalk of the Classification of Instructional Programs (CIP) codes with Standard Occupational Classification (SOC) codes as published by the U.S. Department of Education.

In 2016, the number of Nanotechnology jobs in the target occupations in Santa Clara and San Mateo Counties totaled 3,998. The Bureau of Labor Statistics (BLS) expects the total number of positions to increase by about 2% over the next three years.

## Target Occupations

|  |  |   |
|--|--|---|
| <b>3,998</b><br>Jobs (2016) <sup>1</sup><br>174% above National average <sup>2</sup> | <b>2.1%</b><br>% Change (2016-2019) <sup>3</sup><br>Nation: 2.3% | <b>\$57.15/hr</b><br>Median Hourly Earnings<br>Nation: \$45.69/hr |
|--|--|---|

<sup>1</sup>Based on total number of jobs for target occupations in Santa Clara and San Mateo Counties.

<sup>2</sup>Represents occupation density as compared to national average (national average=1).

<sup>3</sup>Based on turnover and new jobs.

Target occupations that are mapped to the Nanotechnology program are disaggregated to see which occupations are projected to see the highest number of annual openings (Engineers), highest percentage rate of growth over the next three year (Engineers), and the highest median hourly earnings (Engineers). While Engineers are expected to experience job growth (2%) these occupations are highly represented and concentrated in our region (Santa Clara and San Mateo Counties) compared to the national average.

## Target Occupations

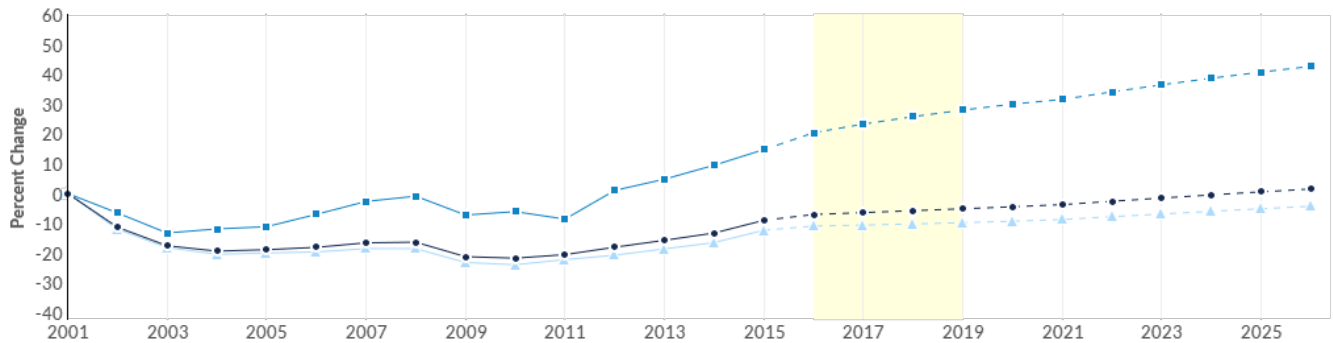
| Occupation              | 2016 Jobs | Annual Openings | Median Hourly Earnings | Growth (2016 - 2019) | Location Quotient (2016) |
|-------------------------|-----------|-----------------|------------------------|----------------------|--------------------------|
| Engineers,<br>All Other | 3,998     | 111             | \$57.15/hr             | 2.08%                | 2.74                     |

Growth in the Nanotechnology occupations show how each occupation is projected to increase in jobs over the next three years. A growth of about 2% is expected in the next three years for Engineers.

### Growth for Engineers, All Other (SOC 17-2199)

|                           |                           |                                 |                                     |
|---------------------------|---------------------------|---------------------------------|-------------------------------------|
| <b>3,998</b><br>2016 Jobs | <b>4,081</b><br>2019 Jobs | <b>83</b><br>Change (2016-2019) | <b>2.1%</b><br>% Change (2016-2019) |
|---------------------------|---------------------------|---------------------------------|-------------------------------------|

### Regional Trends

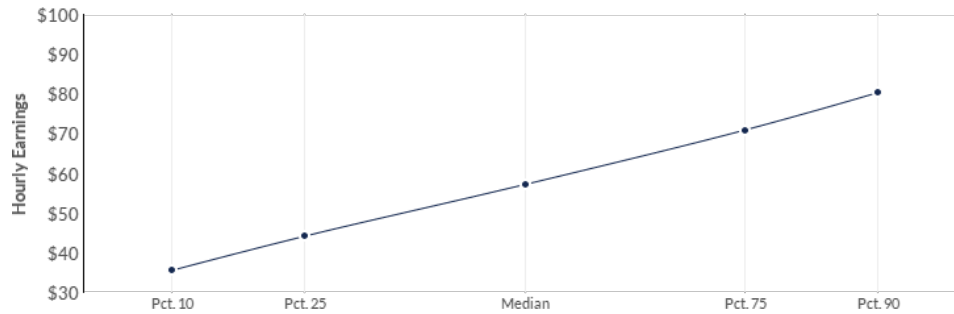


|   | Region                 | 2016 Jobs | 2019 Jobs | Change | % Change |
|---|------------------------|-----------|-----------|--------|----------|
| ● | Region                 | 3,998     | 4,081     | 83     | 2.1%     |
| ■ | San Mateo County, CA   | 639       | 680       | 41     | 6.4%     |
| ▲ | Santa Clara County, CA | 3,359     | 3,401     | 42     | 1.3%     |

The percentile earnings table shows the range the Nanotechnology occupations earn in the region. While the median earnings are approximately \$57.15/hour, wages can range from below \$44/hour to above \$70/hour. Each of the target occupations' range in wages is also displayed.

### Percentile Earnings for Engineers, All Other (SOC 17-2199)

|                          |                   |                          |
|--------------------------|-------------------|--------------------------|
| <b>\$44.11/hr</b>        | <b>\$57.15/hr</b> | <b>\$70.91/hr</b>        |
| 25th Percentile Earnings | Median Earnings   | 75th Percentile Earnings |








## Target Occupations Demographics

The demographics among those employed in Nanotechnology occupations in Santa Clara and San Mateo Counties for 2016 show that a majority are male (88%) and more than a quarter are between the ages of 45-54 (29%) and a majority are White (47%) or Asian (43%).




### Occupation Gender Breakdown

| Gender  | 2016 Jobs | 2016 Percent |   |
|---------|-----------|--------------|---|
| Males   | 3,504     | 87.6%        |  |
| Females | 494       | 12.4%        |  |

### Occupation Age Breakdown

| Age   | 2016 Jobs | 2016 Percent |   |
|-------|-----------|--------------|---|
| 14-18 | 1         | 0.0%         |   |
| 19-24 | 104       | 2.6%         |   |
| 25-34 | 710       | 17.8%        |  |
| 35-44 | 1,005     | 25.1%        |  |
| 45-54 | 1,140     | 28.5%        |  |
| 55-64 | 766       | 19.2%        |  |
| 65+   | 272       | 6.8%         |  |

### Occupation Race/Ethnicity Breakdown

| Race/Ethnicity                            | 2016 Jobs | 2016 Percent |   |
|---|-----------|--------------|---|
| Asian                                     | 1,884     | 47.1%        |  |
| White                                     | 1,701     | 42.5%        |  |
| Hispanic or Latino                        | 282       | 7.0%         |  |
| Black or African American                 | 64        | 1.6%         |   |
| Two or More Races                         | 54        | 1.4%         |   |
| Native Hawaiian or Other Pacific Islander | 8         | 0.2%         |   |
| American Indian or Alaska Native          | 6         | 0.1%         |   |

## Industries Employing Nanotechnology Occupations

A number of industries in Santa Clara and San Mateo Counties employ those trained in Nanotechnology and its related occupations. The following table represents a regional industry breakdown of the number of Nanotechnology positions employed, the percentage of Engineers employed by industry and the percentage Nanotechnology jobs represent within all jobs by each industry. While Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) employed 15% of all regional Nanotechnology positions in 2016, Engineers composed a minority of all jobs in that industry (2%).

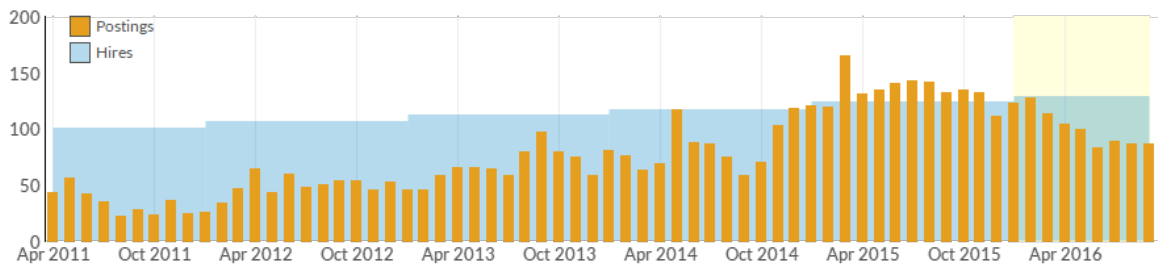
## Industries Employing Engineers, All Other

| Industry  | Occupation<br>Jobs in<br>Industry<br>(2016) | % of<br>Occupation<br>in Industry<br>(2016) | % of Total<br>Jobs in<br>Industry<br>(2016) |
|---|---|---|---|
| Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) | 596   | 14.9%                                       | 1.8%  |
| Electronic Computer Manufacturing   | 350   | 8.8%  | 0.7%  |
| Engineering Services  | 330   | 8.3%  | 2.4%  |
| Semiconductor and Related Device Manufacturing  | 281   | 7.0%  | 1.0%  |
| Federal Government, Civilian, Excluding Postal Service  | 229   | 5.7%  | 2.6%  |

In an average month, there were 102 unique (internet) job postings for Nanotechnology jobs, and 128 actually hired from January 2016 to September 2016. This means there was approximately 1 hire for every 1 unique (internet) job posting for occupations in Nanotechnology. In cases where there were more hires compared to job postings, it suggests that the internet may not be the primary way that job openings for these occupations are advertised.

## Job Postings vs. Hires

|   |  |
|---|--|
| <b>102</b>                                  | <b>128</b>                               |
| Avg. Monthly Postings (Jan 2016 - Sep 2016) | Avg. Monthly Hires (Jan 2016 - Sep 2016) |



| Occupation           | Avg Monthly Postings<br>(Jan 2016 - Sep 2016) | Avg Monthly Hires<br>(Jan 2016 - Sep 2016) |
|----------------------|---|--|
| Engineers, All Other | 102   | 128  |



The top five most relevant hard and soft skills employers list in Nanotechnology job posting descriptions are listed below. The “Postings with Skill” column is the total amount of (internet) job postings that mention the skills listed below. These numbers may be higher than the average monthly postings from above, because this number includes duplicated (internet) job postings. The “Relevance Score” gauge relevance of the skill by indicating the frequency in which this skill is being mentioned in (internet) job postings for Nanotechnology compared to all other (internet) job postings.

## Most Relevant Hard Skills

| Skill                                   | Relevance Score | Postings with Skill |
|---|-----------------|---------------------|
| Small Form-Factor Pluggable Transceiver | 158.52          | 5                   |
| CIP System (Stereochemistry)            | 104.62          | 3                   |
| Laser Sciences                          | 104.62          | 6                   |
| XFP Transceiver                         | 83.70           | 3                   |
| Semiconductor Lasers                    | 82.32           | 6                   |

## Most Relevant Soft Skills

| Skill             | Relevance Score | Postings with Skill |
|-------------------|-----------------|---------------------|
| Agility           | 1.88            | 16                  |
| Creative Thinking | 1.80            | 58                  |
| Memory            | 0.28            | 6                   |
| Reliability       | 0.25            | 28                  |
| Creativity        | 0.17            | 61                  |

# Appendix A - Data Sources and Calculations

## Location Quotient

Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region unique in comparison to the national average.

## Occupation Data

Emsi occupation employment data are based on final Emsi industry data and final Emsi staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level Emsi earnings by industry.

## Completers Data

The completers data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.

## Institution Data

The institution data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.

## CareerBuilder/Emsi Job Postings

Job postings are collected from various sources and processed/enriched by Careerbuilder to provide information such as standardized company name, occupation, skills, and geography. Emsi performs additional filtering and processing to improve compatibility with Emsi data.

## State Data Sources

This report uses state data from the following agencies: California Labor Market Information Department