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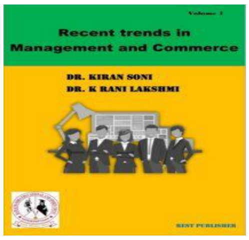

Semiconductor materials selection Using IBM SPSS Statistics

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Abstract

Semiconductor materials Semiconductors are usually metals and conductors that are not conductors or most ceramics conductivity between conductors like are products containing semiconductors such as silicon or germanium may be pure elements or gallium arsenide or cadmium may be selenide-like compounds. A widely worn-out semiconductor silicon, germanium, and gallium arsenide are the components. Fourth, german the oldest type of semiconductor among the items. In german there are four valence electrons, they are the exterior of the atom electrons located in the shell. Semiconductors are usually metals and conductors that are not conductors or most ceramics between such conductors are conductive materials. Semiconductors are silicon or pure elements such as germanium maybe or gallium arsenide or cadmium selenide may be compounded. Stimulant in a process called pure small size in semiconductors impurities are added, which of substance causing large changes in conductivity. They're in manufacturing electronic devices due to their role, semiconductors are not small size semiconductors it is an important part of life. Electronic a life without devices just imagine. Radios, televisions, computers, video games, and bad medical diagnostic tools there won't be. Vacuum tube technology to create many electronic devices using although possible, in the last 50 years occurred in semiconductor technology developments have made electronic devices smaller, made faster, and more reliable. You will encounter electronic devices one minute of all meetings think the last twenty four how many of the following did you watch during the hour or have used each made of electronics contains important components. SPSS statistics is a data management, advanced analytics, multivariate analytics, business intelligence, and criminal investigation developed by IBM for a statistical software package. A long time, spa inc. Was created by, IBM purchased it in 2009. The brand name for the most recent versions is IBM SPSS statistics. Silicon, Gallium arsenide, Cadmium telluride, Germanium, Aluminium nitride, Gallium phosphide, Zinc oxide, Diamond Results: the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .704 which indicates 70% reliability. From the literature review, the above 70% Cronbach's Alpha value model can be considered for analysis. The overall Cronbach's alpha value for the model was .704, indicating 70% reliability. From the literature review, above 70% Cronbach's alpha value model can be considered for analysis.

Keywords: Silicon, Cadmium telluride, Zinc oxide, Diamond, SPSS

Introduction

Fast-growing and flexible amorphous for electronics of transparent oxide semiconductors possible use is the last, but not the least. Glass ft the larger the surface area in the molecule electronics switch to plastic an unmistakable trend. Thin phototransistors (TFT), devices a basic construct for conversion block, instead of mirrors to be fabricated in plastic. As a result, the lower temperature of the TFT sedimentation is an essential requirement for channel materials [1]. Ab initio calculations and photoluminescence spectroscopy band together with the structural parameters are sns2 from full thickness to single layer an indirect bandgap up to full thickness shows that the semiconductor so, with some layered ingredients compared to monolayer sns2 advanced does not exhibit pl, which is sns2 single from total thickness range indirect bandgap to layer our that is semiconductor further supports the theoretical conclusion [2]. A comprehensive source for this information dieter Schroder recognized the need. His book electricity, optics, physical and chemical techniques integrate a wide range of at the same time for the uninitiated provides a guide. About lifetime-measurement techniques in discussing, the electron in semiconductors and the concept of pore lifetimes, very simple in principle since, the topic seems straightforward the author writes. However, in practice, many for a given device there are lifetime values, indeed there are measurement techniques, lifetime is a very complex concept [3]. Solar cells, sensors, thin-film transistors, displays, and logic for next-generation electronics such as circuits as promising ingredients, the organic semiconductors industry and a broad focus on both academia have attracted solution processability is the most of organic semiconductors one of the attractive features is, low price and low temperature additionally, the big area assists to produce the thing. The gadget's efficiency as of right now a lot of organic things for enhancement semiconductors are now a reality, in which most attempts at new π-conjugation in the design and synthesis of vertebrates are paying attention. However, organic strong interactions in coupled systems significantly reduce their solubility, thus for purification and device preparation to afford satisfactory solubility flexible side chains are commonly introduced [4]. Sers method based on semiconductors is particularly fascinating because inherent in semiconductor materials physicochemical properties sers- based on analytical techniques provides possibilities. In sers of the effect of according to semiconductor-based sers techniques, semiconductor materials are based on semiconductor-as enhanced raman scattering can be classified into two parts, where a semiconductor material directly raman of molecules that have been adsorbed a semiconductor function as an "antenna" in enhanced raman scattering, which uses it as a substrate to boost signals. Or if it's a trap, it is from a metal substrate to modify the resulting raman enhancement [5]. The most important of semiconductors feature carrier concentration is several orders of magnitude limiting the amounts. Crystal of intangibles rather than goods a distinct advantage is less uniformly thin at temperature large area deposition of films is the ability to. In the 1950s this research on amorphous semiconductors having both advantages started looking for things [6]. For layer x chalcogenides for transparent conducting oxides concept of product design by using, many both n- and p-type the fundamental optical and electrical properties of layered bull chalcogenides, which have been proposed as gap semiconductors, were examined. Oxide layers, covalent layers, and layer ox chalcogenides are made up of layers of chalcogenides and are wide gaps for these items, respectively. Energy band computations have been used to investigate the electronic structures of several materials using normal/inverse photoemission spectroscopy [7]. However, gallium arsenide (GAAS) compound semiconductors such as silicon have some electronic properties rather than properties have GAAS electron dense speed and high electron mobility contains, from which transistors formed 25 to operate at frequencies above GHZ allows also, GAAS devices are more silicon when operating at frequencies less noise than other devices create they are equivalent silicon than devices at greater power levels effective as a result of our highly breakable have voltages [8]. With conventional semiconductor devices compared, the charge of electrons is used only, in spintronics some advantages of data processing are increased speed, higher data storage density, volatility of data storage, and low energy consumption. Magnetic data current such as read heads for storage magnetic devices are mainly ferromagnetic and are based on metals. Development of modern industrial semiconductors novel magnetic compatibility with techniques development of semiconductors, semiconductors and provides more opportunities to combine magnetic properties [9]. Nanotechnology for environmental applications of structured semiconductor materials design, fabrication, and modification our latest progress in this review mainly describes. We briefly discuss their possible uses in the energy sector. The article's goal is to various semiconductors materials, especially tio2 focuses on based nanostructures [10]. For example, for sophisticated devices, accurate modeling of saturation velocity is a crucial component of device simulation. Higher electron mobility transistors (Hemts), where the relationship between gain and saturation speed is direct. Saturation velocity vs. Temperature in the Minimos-nt two-dimensional device simulator we present a model for dependent activation. The new model includes materials and binary iii-v group semiconductors such as GAAS, ALAS, INAS, and gap as well as basic semiconductors Si and Ge [11]. Since the transistor was created in 1948, semiconductor technology has evolved. Initially, semiconductor-based transistors are mainly two of the semiconductors silicon and germanium physicochemical interface properties are based on transistors important physical properties in action the real area of the stack in and thickness and finish of the complete device relates to size and shape. Most importantly, the semiconductor the chemical of the active moiety characteristics behavior, and final device an important role in determining performance it was known early on that the [12]. Transparent with good performance of p-type oxide semiconductors creation, transparency, energy efficiency and require more circuit complexity as a real enabler for various applications maybe. In various programs screens, sensors, photovoltaics, memristors, transparent electronics, and includes electrochromic. Therefore, here, p-type oxide semiconductors-based materials and the latest developments in devices are reviewed, of which triple spinel-containing oxides, binary copper oxides, tin monoxide, and nickel oxides are examples of cu-bearing oxides [13]. Organic semiconductor materials are flexible advantage of solution processing as images provide typically, their disadvantage is their low charge. Using the carrier movement, which is with the packing of molecules locally amorphous and crystalline, and macroscopic with length measurements of grain boundaries sorting avoids this problem and offers opportunity. An advanced concept is different liquid crystal use of materials with levels, less viscosity of the high-temperature phase orientation and, during cooling room for macroscopic orientation excellent at temperature, crystalline includes conversion to the grid [14]. A very important optoelectronic as one of the devices, the light is electrified and capable of converting into signals photodetectors, video, communications switching, environmental monitoring, ozone detection, and flame sensing at their best potential in imaging applications attract serious attention. Night vision, identifying objects finding, early primary tumors detection, astronomy [15]. Computers, smartphones, PDAS, digital cameras, and other electronic entertainment systems, as well as electronic medical equipment utilized in a variety of applications integrated electronic systems of their importance while creating due to semiconductor materials and devices, are primarily technologically occupied the position. Disease detection and environmental monitoring [16]. Among these promising therapies most are titania nano semiconductor nature of the platforms are based on, their deficiency modulation to photothermal hyperthermia. The life of these titania semiconductors compatibility and biosafety for their further clinical translation are highlighted to provide assurance. Titania-based therapeutic nano challenges and future of platforms developments and potential for tumor-specific therapy relevant to clinical translation developed treatment methods are discussed and observed[17].

Materials & Methods

Silicon: Silicon is a semiconductor material it is the most widely used type. Its main advantage is that it is simple to make and generally excellent and has mechanical and electrical qualities. Another benefit is that it creates high-quality silicon oxide when applied to integrated circuits, which is different from the activity of ics. Layers of insulation between components are used. High with oxygen 1823 because of the chemical connection john's jacob berzelius until the year it was first produced in its purest form able to classify. Its oxides of ions called silicates create a family. Its melting and boiling points are 1414 °c and 3265, respectively °c, all metalloids and metals the second highest among the non- is surpassed only by boron. Silicon in the universe based on mass the eighth common element, but of earth as a pure element on the surface occurs very rarely.

Gallium arsenide: Next to silicon the second most popular type of semiconductor is gallium arsenide. Its higher electron high-efficiency rf is used for motion it is widely used in devices. It is comparable to other iii-v semiconductors also used as a molecule, such as gainnas and ingaas. But it is more delicate than material and silicon. It has restricted movement. It is not viable due to uses like p-type cmos transistors. Fabrication is relatively hard and it is gaas that increases the cost of devices.

Cadmium telluride: Cadmium telluride (CDTE) is cadmium and formed from a stable crystalline compound is tellurium. This is important in cadmium telluride photovoltaics and the infrared optical window used as a semiconductor material. Typically, it contains cadmium sulfide. P-n junction and sandwiched creates solar PV cells. Thin film solar CDTE, which is used to create batteries, made up around 8% of all solar cells installed in 2011. They are the cheapest solar cells. Comparison of the total installed cost of the installation is one of the price categories. Other additional characteristics change quickly every year. Solar CDTE cell is the first solar on the market dominate. In 2011, about 2 GWP of CDTE solar cells were produced cadmium for further details and discussion see telluride photovoltaics.

Germanium: This type of semiconductor material since radar detection diodes many early transistors was used in devices. Diodes have high reverse conductivity and show the temperature coefficient, this means early transistors may be affected by heat flow. Silicon better charge carrier mobility than provides, therefore, for some rf devices is used. An ideal semiconductor these days because of the availability of materials not widely used. Semiconductor germany's largest in-the-field application is available. Small amounts of arsenic, gallium, indium, antimony, or phosphorus with, german for use in electronic devices used to make transistors. Make germanium alloys, also used as a phosphor in incandescent lamps.

Aluminium nitride: Aluminum nitride (aln) is it is an aluminium solid nitride. It may reach 321 w/(mk) of heat. This material is an electrical insulator and has conductivity. At ambient temperature, the band gap of its wurtzite phase (w-aln) is 6 ev contains deep uv opto operating at frequencies and has potential application in electronics. Aluminum nitride is an electrical insulator and some that provide high thermal conductivity one of the items. This is the heat sink and heat spreader applications in high power electronic applications making aln more effective.

Gallium phosphide: This semiconductor material is used in led technology it has found many uses. It is low to medium for many starters used in luminescent leds, another varies depending on the impact of dopants produce color. The light from pure gallium phosphide is green. Nitrogen-doped forms, it emits yellow-green light that is zno-doped. A red color when done. Gallium phosphide from low-cost low cost with medium brightness red, orange and green light-emitting used in the manufacture of diodes (leds). Its durability at high current is comparatively short and in its lifetime sensitive to temperature.

Zinc oxide: Using the formula, zinc oxide zno it's an inorganic substance. It is a white, water-soluble powder. Cosmetics, food, rubber, plastic, ceramic, glass, cement, lubricants, paints, ointments, adhesives, pigments, batteries, ferrites, and several additives like zno and fire retardants are used in many items. - aid cassettes. Natural occurrences include zincite, a mineral. But the majority of zinc oxide is manufactured synthetically.

Diamond: Diamond is carbon is the element's solid form, a diamond-cubic crystal made of atoms is embedded in the system. Graphite another of carbon called the solid form is at room temperature and the chemistry of carbon under pressure is a technically stable form, but diamond is metastable, and that at a very low rate under the conditions changes it. A diamond is anything the highest of natural products hardness and thermal conductivity contains, cutting, and polishing in major industrial applications such as characteristics used. Diamond anvil cells are found deep in the earth subjecting materials to stresses is the reason. In diamond structure of atoms is very complex because of that, some kinds of impurities in it the two pollutants nitrogen and boron are exceptions. One defect or impurity per million is a modest number of flaws. Lattice atoms have the following colors: green, brown flaws, yellow nitrogen, and diamond blue boron. Exposure to radiation, purple, pink, and refractive index that is relatively high has a considerable optical dispersion as well.

Methods:IBM created the statistical software package SPSS statistics, which includes features for data management, advanced analytics, multivariate analytics, business intelligence, and criminal investigation. Spa Inc., a long time. was developed by IBM and bought in 2009. The most recent versions are marketed under the name IBM SPSS statistics. It is usual practise to utilise the "statistical package for the social sciences" (SPSS), a collection of software tools for modifying, analysing, and displaying data. SPSS supports a number of formats. To expand the software's data entry, statistical, or reporting capabilities, many add-on modules can be purchased. The main application is known as SPSS base. The most crucial of them for statistical analysis, in our opinion, are the SPSS advanced models and the add-on modules for the SPSS regression model. Additionally, independent programs that connect with SPSS are available from spas Inc. SPSS is available in versions for windows (98, 2000, me, nt, and XP), supported by windows 2000 running SPSS version 11.0.1. Although further versions of the SPSS will most likely be available by the time this book is released, we are certain that the SPSS instructions provided in each chapter will still apply to the studies outlined.

Result and Discussion

TABLE 1. Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.704	.702	8

Table 1 shows the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .704 which indicates 70% reliability. From the literature review, the above 70% Cronbach's Alpha value model can be considered for analysis.

TABLE 2. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted

Silicon	0.671
Gallium arsenide	0.692
Cadmium telluride	0.67
Germanium	0.678
Aluminium nitride	0.631
Gallium phosphide	0.656
Zinc oxide	0.637
Diamond	0.743

Table 2 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results Silicon 0.671, Gallium arsenide 0.692, Cadmium telluride 0.67, Germanium 0.678, Aluminium nitride 0.631, Gallium phosphide 0.656, Zinc oxide 0.637, Diamond 0.743.

TABLE 3. Descriptive Statistics

Descriptive Statistics													
	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Silicon	44	4	1	5	135	3.07	.161	1.065	1.135	-.504	.357	.152	.702
Gallium arsenide	44	4	1	5	129	2.93	.185	1.228	1.507	.451	.357	-.671	.702
Cadmium telluride	44	4	1	5	138	3.14	.205	1.357	1.841	.034	.357	-1.066	.702
Germanium	44	4	1	5	139	3.16	.169	1.119	1.253	-.224	.357	-.037	.702
Aluminium nitride	44	4	1	5	146	3.32	.232	1.537	2.362	-.123	.357	-1.576	.702
Gallium phosphide	44	4	1	5	155	3.52	.204	1.355	1.837	-.109	.357	-1.465	.702
Zinc oxide	44	4	1	5	127	2.89	.206	1.368	1.871	.043	.357	-1.075	.702
Diamond	44	4	1	5	133	3.02	.199	1.320	1.744	.147	.357	-.992	.702
Valid N (listwise)	44												

Table 3 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation, Variance, Skewness, Kurtosis. Silicon, Gallium arsenide, Cadmium telluride, Germanium, Aluminium nitride, Gallium phosphide, Zinc oxide, Diamond this also using.

TABLE 4. Frequency Statistics

Statistics									
		Silicon	**Gallium arsenide**	**Cadmium telluride**	**Germanium**	**Aluminium nitride**	**Gallium phosphide**	**Zinc oxide**	**Diamond**
N	Valid	44	44	44	44	44	44	44	44
	Missing	3	3	3	3	3	3	3	3
Median		3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Mode		3	3	3	3	5	5	3	3
Percentiles	25	3.00	2.00	2.00	3.00	2.00	2.00	2.00	2.00
	50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	75	4.00	3.75	4.75	4.00	5.00	5.00	4.00	4.00

Table 4 Shows the Frequency Statistics in Silicon, Gallium arsenide, Cadmium telluride, Germanium, Aluminium nitride, Gallium phosphide, Zinc oxide, Diamond curve values are given. Valid 44, Missing value 3, Median value 3.00, Mode value 3.

Histogram Analysis

Figure 1 shows the histogram plot for the Silicon from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3 for the Silicon except for the 2 value all other values are under the normal curve shows the model is significantly following a normal distribution. Figure 2 shows the histogram plot for the Gallium arsenide from the figure it is clearly seen that the data are slightly Right skewed due to more respondents choosing 3 for the Gallium arsenide except for the 2 value all other values are under the normal curve shows the model is significantly following a normal distribution.

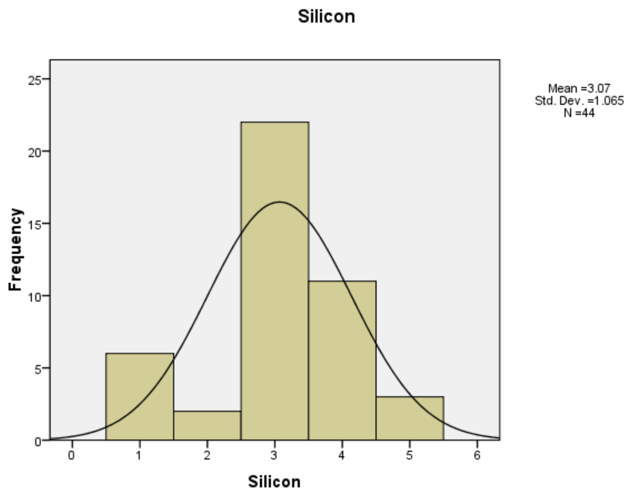

FIGURE 1. Silicon

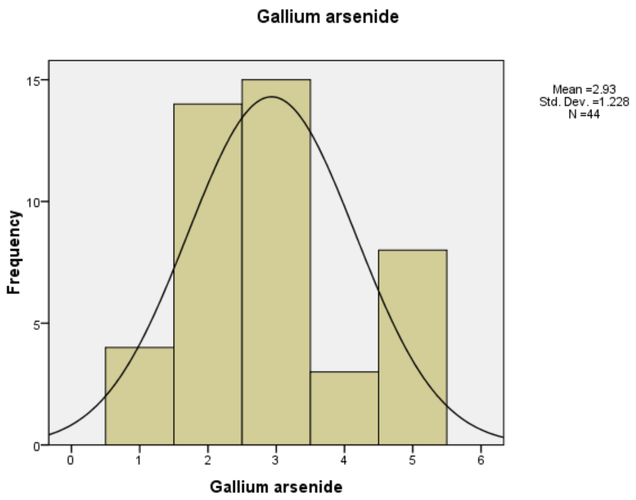

FIGURE 2. Gallium arsenide

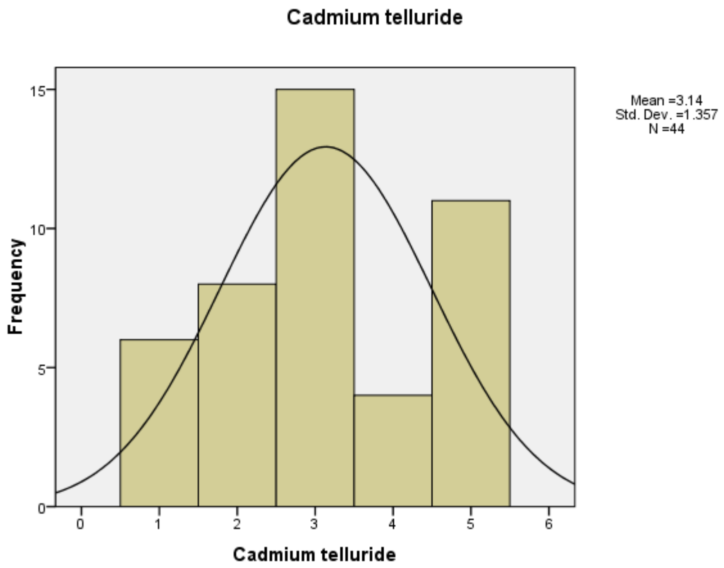

FIGURE 3. Cadmium telluride

Figure 3 shows the histogram plot for the Cadmium telluride from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3 for the Cadmium telluride except for the 3 value all other values are under the normal curve shows the model is significantly following a normal distribution.

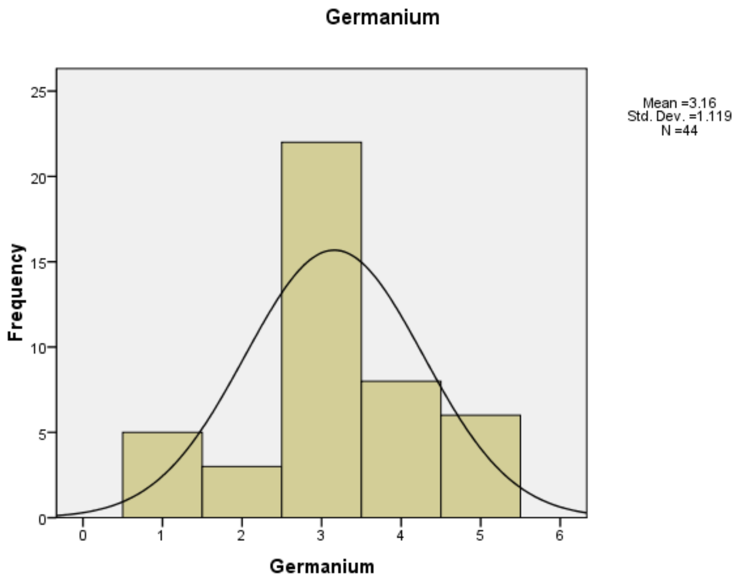

FIGURE 4. Germanium

Figure 4 shows the histogram plot for the Germanium from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 3 for the Germanium except for the 3 value all other values are under the normal curve shows the model is significantly following a normal distribution.

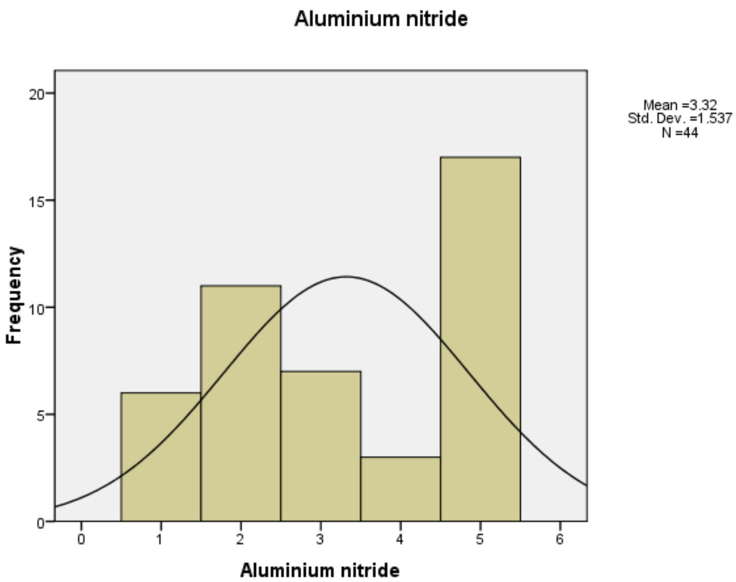

FIGURE 5. water treatment plant

Figure 5 shows the histogram plot for the Aluminium nitride from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 5 for the Aluminium nitride except for the 3 value all other values are under the normal curve shows the model is significantly following a normal distribution.

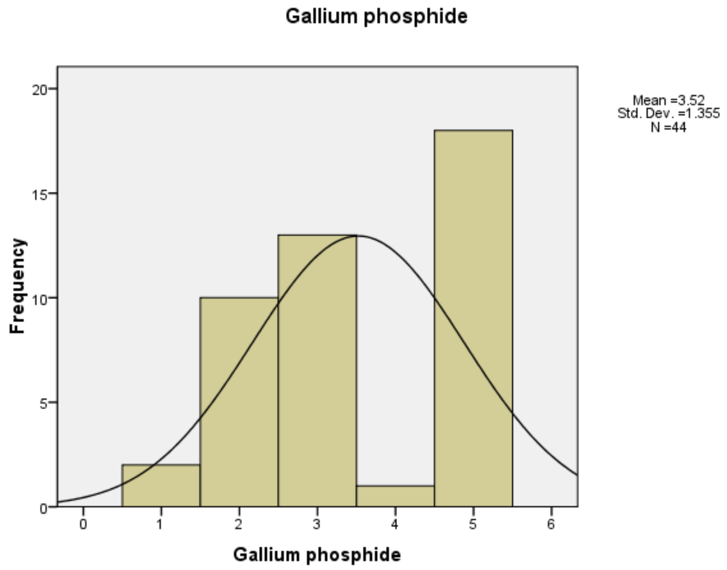

FIGURE 6. Gallium phosphide

Figure 6 shows the histogram plot for the Gallium phosphide from the figure it is clearly seen that the data are slightly Left skewed due to more respondents choosing 5 for the Gallium phosphide except for the 2 value all other values are under the normal curve shows the model is significantly following a normal distribution.

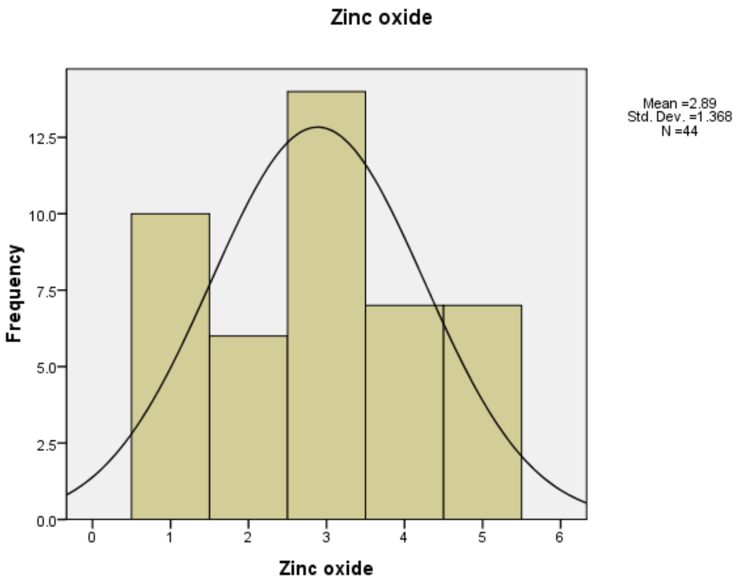

FIGURE 7. Zinc oxide

Figure 7 shows the histogram plot for the Zinc oxide from the figure it is clearly seen that the data are slightly Right skewed due to more respondents choosing 3 for the Zinc oxide except for the 3 value all other values are under the normal curve shows the model is significantly following a normal distribution.

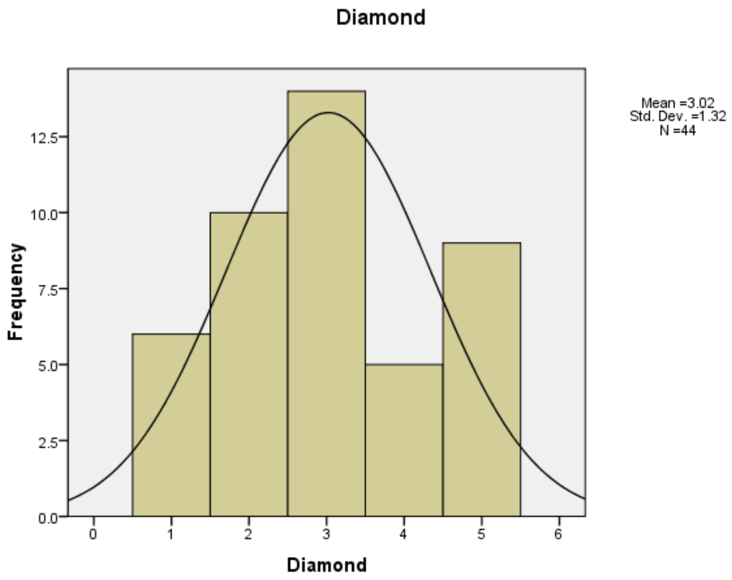

FIGURE 8. Diamond

Figure 8 shows the histogram plot for the Diamond from the figure it is clearly seen that the data are slightly Bell karo skewed due to more respondents choosing 3 for the Diamond except for the 2 value all other values are under the normal curve shows the model is significantly following a normal distribution.

TABLE5. Correlations

Correlations								
	Silicon	**Gallium arsenide**	**Cadmium telluride**	**Germanium**	**Aluminium nitride**	**Gallium phosphide**	**Zinc oxide**	**Diamond**
Silicon	1	0.128	.315*	.342*	0.256	.313*	.405**	-0.034
Gallium arsenide	0.128	1	0.187	0.076	0.271	0.092	0.286	0.216
Cadmium telluride	.315*	0.187	1	.491**	.302*	0.15	.334*	-0.054
Germanium	.342*	0.076	.491**	1	0.2	0.205	0.24	0.029
Aluminium nitride	0.256	0.271	.302*	0.2	1	.577**	.394**	0.168
Gallium phosphide	.313*	0.092	0.15	0.205	.577**	1	.535**	-0.033
Zinc oxide	.405**	0.286	.334*	0.24	.394**	.535**	1	-0.024
Diamond	-0.034	0.216	-0.054	0.029	0.168	-0.033	-0.024	1
*. Correlation is significant at the 0.05 level (2-tailed).								
**. Correlation is significant at the 0.01 level (2-tailed).								

Table 5 shows the correlation between motivation parameters for the Silicon For Zinc oxide is having the highest correlation the Diamond is having the lowest correlation. Next, the correlation between motivation parameters for Gallium arsenide for the Zinc oxide is having the highest correlation with Germanium having the lowest correlation. Next, the correlation between motivation parameters for Cadmium telluride for the Germanium is having the highest correlation with Diamond having the lowest correlation. Next, the correlation between motivation parameters for Germanium for the Cadmium telluride is having the highest correlation with Diamond having the lowest correlation. Next, the correlation between motivation parameters for Aluminium nitride for the Gallium phosphide is having the highest correlation with Germanium having the lowest correlation. Next, the correlation between motivation parameters for Gallium phosphide for the Aluminium nitride is having the highest correlation with Diamond having the lowest correlation. Next, the correlation between motivation parameters for Zinc oxide for the Gallium phosphide is having the highest correlation with Diamond having the lowest correlation. Next, the correlation between motivation parameters for Diamond for the Gallium arsenide is having the highest correlation with Cadmium telluride having lowest correlation.

Conclusion

Semiconductor materials are nominally small band gap insulators. Definition of semiconductor material characteristically, its electronic properties can be controlled doping it with modifying impurities can be reconciled by doing transistors, lasers and solar in devices such as batteries computer and photovoltaics due to their application in the field, searching for new semiconductor materials and existing items optimization is one of the materials sciences it is an important field of study. Generally, semiconductor materials used crystalline minerals are solids. These items are their volume according to the periodic table groups of atoms are categorized. Different semiconductor materials differ in their properties. Therefore, in comparison to silicon, the composition advantages and disadvantages of semiconductors have both. For example, gallium arsenide (gaas) is silicon has six times more electron mobility than this allows for faster processing; the wider the band gap, the higher it is to operate power devices at temperature allows, and at room temperature low heat for low power devices makes noise; its live band the gap is the indirect band of silicon more positive than gap gives optical properties; it is triple and with quaternary compounds, concn with band gap width, light emission at selected wavelengths allows, it through optical fibers with wavelengths transmitted more efficiently makes matching possible. Gaas is a semi- can also be grown in insulating form, lattice-matched insulating for devices suitable for substrate. Conversely, silicon sturdy, cheap and processable easy, whereas gaas is brittle and the higher the price, the more oxide insulation by growing layer layers cannot be created; therefore where silicon is insufficient only gaas is used. Semiconducting products are expensive and plentiful silicon is the first expensive rare earth elements (rees) are available. Solar cells, field-effect transistors, iot sensors and self-driving all car circuits are semiconductors to operate materials required. Its the modern world semiconductors for existence and their for materials used in manufacturing really owe it. Existing semiconductor materials are their as physical limits are reached, the new items get their place are ready. For these items market, with new semiconductor applications together, industry-wide manufacturing and material purchases change. The dynamics of semiconductor manufacturing to understand, the existing semiconductor materials and their makeup how it affects electronic devices it is important to understand that. Industry news commodity prices and the latest on research provides information but current material properties and limitations tend to be aware.

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