Element	Wt, %	At, %	Z	A	F
MgK	35.46	38.83	1.0068	0.9871	1.0097
SiK	64.54	61.17	0.9963	0.9548	1.0000

Fig 4. - X-ray spectra and microanalysis results initial system Si/Mg/Si/sitall. where Wt is the weight content of the element, At is the atomic content of the element, Z, A, F are correction factors

X-ray diffraction studies of the elemental composition of the initial Si-Mg-Si systems on a SEM 515 scanning electron microscope with an attachment for microanalysis showed that the atomic ratio of Mg to Si was ~2/1 (Fig 4), which is optimal for the formation of the Mg_2Si magnesium silicide phase. The rest of the peaks belong to the elements that make up the glass-ceramic.

Dependence analysis shows that in all processing modes there is a sharp rise in temperature, and then its decline. It follows from the given data that at energy densities from 337.5 to 390 J/cm^2 temperatures are reached that are sufficient for the formation of magnesium silicide Mg_2Si.

As a result of the work, a technique for applying a three-layer silicon-magnesium-silicon composition on glass-ceramic substrates was developed. A computer simulation of the temperature change with time in the Si/Mg/Si/sitall system under pulsed photon treatment was carried out, on the basis of which the optimal temperatures and pulse durations for the synthesis of magnesium silicide were determined.

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REZYUME. Bu silicid-kremniy getero-birikmalarini yaratish va yangi yarimo'tkazgich qurilmalarini qurish uchun etarli shart emas. Shu sababli, kremniyda Mg_2Si plyonkalarini hosil qilishning yangi usullarini ishlab chiqish shubhasiz qiziqish uyg'otadi, bunda plyonkalarning kristallik sifatini yaxshilash uchun yuqori haroratlardan foydalanish mumkin. Ushbu ishda magniy silisidini hosil qilish uchun tezkor issiqlik bilan ishlov berish (TIB) usuli qo'llanildi. Buning asosida magniy silisidini sintez qilish uchun optimal haroratlar va impuls davomiyligi aniqlanadi.

РЕЗЮМЕ. Для создания гетеропереходов силицид-кремний и построения новых полупроводниковых приборов это не является достаточным условием. Поэтому представляет несомненный интерес разработка новых способов формирования пленок Mg_2Si на кремнии, в которых можно использовать более высокие температуры для повышения кристаллического качества пленок. В данной работе для формирования силицида магния использовали метод быстрой термической обработки (БТО) на основании которого определены оптимальные температуры и длительности импульса для синтеза силицида магния

SUMMARY. This is not a sufficient condition for creating silicide-silicon heterojunctions and building new semiconductor devices. Therefore, it is of undoubted interest to develop new methods for the formation of Mg_2Si films on silicon, in which higher temperatures can be used to improve the crystalline quality of the films. In this work, the rapid heat treatment (RHT) method was used to form magnesium silicide. on the basis of which the optimal temperatures and pulse durations for the synthesis of magnesium silicide are determined

VIET TEOREMASÍNAN PAYDALANÍP PARAMETRLI KVADRAT TEŃLEMELERDI SHESHIW USÍLLARÍ

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Tayanch soʻzlar: parametr, kvadrat tenglamalar, tenglamaning korenlari.

Ключевые слова: параметр, квадратные уравнения, корни уравнения.

Key words: parameter, quadratic equations, equation roots.

Bizge mektep matematika kurısınan keltirilgen hám tolıq kvadrat teńlemeler ushın Viet teoreması tómendegishe bolatuǵını belgili:

1. Keltirilgen $x^2+px+q=0$ kvadrat teńlemesi ushın Viet teoreması: $x_1+x_2=-p,\quad x_1\cdot x_2=q$

2. Tolıq $ax^2+bx+c=0$ kvadrat teńlemesi ushın Viet teoreması:

$$x_1+x_2=-\frac{b}{a},\quad x_1\cdot x_2=\frac{c}{a}$$

Parametrli kvadrat teńlemeler kóbinese Viet teoremasınan paydalanıp ansat sheshiledi.

1-mısal. x_1 hám x_2 sanları $x^2+3x+m=0$ teńlemesiniń korenleri bolsa, m niń qanday mánisinde teńlemeniń korenleriniń ayırması 6 ǵa teń boladı.

Sheshiw. Meyli $x_1>x_2$ bolsın, onda máseleniń shárti boyınsha $x_1-x_2=6$ boladı. m niń mánisin tabıw ushın berilgen teńlemeniń korenlerin tómendegi teńlemeler sistemasın sheshiw arqalı tabamız:

$$\begin{cases}x_1+x_2=-3\\x_1-x_2=6\end{cases}\Leftrightarrow\begin{cases}x_1+x_2=-3\\x_1=x_2+6\end{cases}\Leftrightarrow\begin{cases}x_2+6+x_2=-3\\x_1=x_2+6\end{cases}\Leftrightarrow$$

$$\Leftrightarrow\begin{cases}2x_2=-9\\x_1=x_2+6\end{cases}\Leftrightarrow\begin{cases}x_2=-\dfrac{9}{2}\\x_1=-\dfrac{9}{2}+6\end{cases}\Leftrightarrow\begin{cases}x_2=-\dfrac{9}{2}\\x_1=\dfrac{3}{2}\end{cases}$$

Viet teoreması boyınsha

$$m=x_1\cdot x_2=\frac{3}{2}\cdot\left(-\frac{9}{2}\right)=-\frac{27}{4}.$$

Juwabı. $m=-\dfrac{27}{4}.$

2-mısal. Eger $x^2-bx-b=0$ teńlemeniń korenleri $x_1^3+x_2^3+x_1^3\cdot x_2^3=27$ shárti menen berilgen bolsa, b nıń mánisin tabıń.

Sheshiw. Berilgen kvadrat teńlemeden Viet teoremasınan paydalanıp tómendegi teńliklerdi jazamız:

$$x_1+x_2=b,\ x_1\cdot x_2=-b \qquad (1)$$

Mısaldıń berilgen shártin tómendegishe túrlendiremiz:

$$x_1^3+x_2^3+x_1^3\cdot x_2^3=\left(x_1^3+3x_1^2\cdot x_2+3x_1\cdot x_2^2+x_2^3\right)+$$
$$+\left(-3x_1^2\cdot x_2-3x_1\cdot x_2^2\right)+x_1^3\cdot x_2^3=$$
$$=\left(x_1+x_2\right)^3-3x_1\cdot x_2\left(x_1+x_2\right)+x_1^3\cdot x_2^3=27$$

Bul tabılǵan teńlikke (1) niń mánislerin qoyamız:

$$b^3-3b(-b)+(-b)^3=27\Leftrightarrow b^3+3b^2-b^3=$$
$$=27\Leftrightarrow 3b^2=27\Leftrightarrow b^2=9\Leftrightarrow b=\pm3.$$

Juwabı. $b=\pm3.$

3-mısal. x_1 hám x_2 sanları $2x^2+5x-7=0$ teńlemesiniń korenleri bolsa, $\dfrac{2x_1^2+3x_1x_2+2x_2^2}{4x_1^2x_2+4x_1x_2^2}$ bólsheginiń mánisiniń durıs yamasa nadurıs bólshek bolatuǵınıń anıqlań.

Sheshiw.

$$\frac{2x_1^2+3x_1x_2+2x_2^2}{4x_1^2x_2+4x_1x_2^2}=\frac{2x_1^2+4x_1x_2+2x_2^2-x_1x_2}{4x_1^2x_2+4x_1x_2^2}= \qquad (1)$$
$$=\frac{2\left(x_1^2+2x_1x_2+x_2^2\right)-x_1x_2}{4x_1x_2\left(x_1+x_2\right)}=\frac{2\left(x_1+x_2\right)^2-x_1x_2}{4x_1x_2\left(x_1+x_2\right)}$$

Berilgen kvadrat teńlemeden Viet teoremasınan paydalanıp tómendegi teńliklerdi jazamız:

$$x_1+x_2=-\frac{5}{2},\ x_1\cdot x_2=-\frac{7}{2}$$

Bul mánislerdi (1) ge qoyamız:

$$\frac{2x_1^2+3x_1x_2+2x_2^2}{4x_1^2x_2+4x_1x_2^2}=\frac{2\left(x_1+x_2\right)^2-x_1x_2}{4x_1x_2\left(x_1+x_2\right)}=$$
$$=\frac{2\left(-\frac{5}{2}\right)^2-\frac{7}{2}}{4\cdot\left(-\frac{5}{2}\right)\cdot\left(-\frac{7}{2}\right)}=\frac{\frac{25}{5}+\frac{7}{2}}{35}=\frac{16}{35}<1.$$

Demek, berilgen bólshek durıs bólshek.

Juwabı. Durıs bólshek.

4-mısal. $4x^2-\sqrt{85}x+5\frac{1}{4}=0$ teńlemesin sheshpesten, onıń korenleriniń kublarınıń ayırmasın tabıń.

Sheshiw. Berilgen teńlemeniń eki jaǵın 4 ke bólemiz:

$$x^2-\frac{\sqrt{85}}{4}x+\frac{21}{16}=0$$

Bul teńlemeni Viet teoremasınan paydalanıp tómendegishe jazamız:

$$x_1+x_2=\frac{\sqrt{85}}{4},\ x_1\cdot x_2=\frac{21}{16}$$

Meyli $x_1>x_2$ bolsın,

$$x_1^3-x_2^3=\left(x_1^3-3x_1^2x_2+3x_1x_2^2-x_2^3\right)+$$
$$+\left(3x_1^2x_2-3x_1x_2^2\right)=\left(x_1-x_2\right)^3+3x_1x_2\left(x_1-x_2\right) \qquad (1)$$

Teńlemeniń korenleriniń ayırmasın tómendegishe túrlendiremiz:

$$x_1-x_2=\sqrt{\left(x_1-x_2\right)^2}=\sqrt{x_1^2-2x_1\cdot x_2+x_2^2}=\sqrt{x_1^2+2x_1\cdot x_2+x_2^2-4x_1\cdot x_2}=$$
$$=\sqrt{\left(x_1+x_2\right)^2-4x_1\cdot x_2}=\sqrt{\frac{85}{16}-4\cdot\frac{21}{16}}=\sqrt{\frac{85-84}{16}}=\sqrt{\frac{1}{16}}=\frac{1}{4},$$

Bul tabılǵanlardı (1) ge qoyamız:

$$x_1^3-x_2^3=\left(x_1-x_2\right)^3+3x_1x_2\left(x_1-x_2\right)=$$
$$=\left(\frac{1}{4}\right)^3+3\cdot\frac{21}{16}\cdot\frac{1}{4}=\frac{1}{64}+\frac{63}{64}=\frac{64}{64}=1.$$

Juwabı. $x_1^3-x_2^3=1.$

5-mısal. a parametriniń qanday mánislerinde $x^2+5x+a=0$ teńlemesi- niń korenleri x_1 hám x_2 $\dfrac{x_1}{x_2}+\dfrac{x_2}{x_1}+a>0$ teńsizligin qanaatlandıradı.

Sheshiw. Berilgen kvadrat teńleme sheshimge iye bolıwı ushın onıń diskriminantı oń bolıwı tiyis, yaǵnıy $D=25-4a\ge0\Leftrightarrow 4a\le25\Leftrightarrow a\le\frac{25}{4}.$

Berilgen teńlemeni Viet teoremasınan paydalanıp tómendegishe jazamız:

$$x_1+x_2=-5,\ x_1\cdot x_2=a$$

Berilgen teńsizlik shártin tómendegishe túrlendiremiz:

$$\frac{x_1}{x_2}+\frac{x_2}{x_1}+a=\frac{x_1^2+x_2^2+ax_1x_2}{x_1x_2}=\frac{x_1^2+2x_1x_2+x_2^2-2x_1x_2+ax_1x_2}{x_1x_2}=$$
$$=\frac{\left(x_1+x_2\right)^2-2x_1x_2+ax_1x_2}{x_1x_2}=\frac{a^2-2a+25}{a}>0$$
$$\frac{a^2-2a+25}{a}>0\Leftrightarrow\frac{a^2-2a+1+24}{a}>0\Leftrightarrow\frac{(a-1)^2+24}{a}>0\Leftrightarrow a>0.$$

Juwabı. $0<a\le\frac{25}{4}.$

6-mısal. Eger $tg\alpha$ hám $tg\beta$, $4x^2-3x+1=0$ teńlemesiniń korenleri bolsa, α hám β múyeshleriniń qosındısın tabıń.

Sheshiw. Berilgen teńlemeni Viet teoremasınan paydalanıp tómendegi- she jazamız:

$$x_1+x_2=\frac{3}{4},\ x_1\cdot x_2=\frac{1}{4}$$

Sonıń menen birge $x_1=tg\alpha$ hám $x_2=tg\beta$ berilgen kvadrat teńlemeniń korenleri, olay bolsa α hám β múyeshleriniń qosındısın tabıw ushın eki múyeshtiń qosındısınıń tangensi formulasınan paydalanıp tómendegishe tabamız:

$$tg(\alpha+\beta)=\frac{tg\alpha+tg\beta}{1-tg\alpha\cdot tg\beta}=\frac{x_1+x_2}{1-x_1\cdot x_2}=\frac{\frac{3}{4}}{1-\frac{1}{4}}=\frac{\frac{3}{4}}{\frac{3}{4}}=1$$

Bunnan $tg(\alpha+\beta)=1\Leftrightarrow\alpha+\beta=\frac{\pi}{4}+\pi n,\ n\in Z.$

Juwabı. $\alpha+\beta=\frac{\pi}{4}+\pi n,\ n\in Z$.

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REZYUME. Ushbu maqolada Viet teoremasidan foydalanib parametrli kvadrat tenglamalarni yechish usullari ko`rsatilgan.

РЕЗЮМЕ. В этой статье приведены методы решения квадратных уравнений с параметром при помощи теоремы Виета.

SUMMARY. This article provides methods for solving quadratic equations with a parameter using Vieta's theorem.