ACADEMIC YEAR 2017-2018

SAI SPURTHI INSTITUTE OF TECHNOLOGY

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B.GANGARAM, SATHUPALLY – 507303, Khammam Dist. T.S

Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during the year.

Total number of books and chapters in edited volumes/books published and papers in national/ international conference proceedings during the year.

List of the Conferences during Academic Year 2017-18

S.NO	Title of the book/chapters published/ Conference	Name of the teacher	National / International
1.	Low-Power and Area-Efficient FIR Filter Implementation Using CSLA with BEC	Mrs. M Sumalatha	International
2.	Structural and spectroscopic studies of Lead Germinate Glass System Doped with CoO	Shaik Meera Saheb	National
3.	Analysis Of Micro Strip Antennas Using Antenna Measurement System	Mr. R.Ramprasad	International
4.	Analysis Of Micro Strip Antennas Using Antenna Measurement System	Mr. U.Nageswara Rao	International
5.	A Study on Impact of Green Marketing on Sustainable Development	Dr. D.N. V. Krishna Reddy	National

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Low-Power and Area-Efficient FIR Filter Implementation Using CSLA with BEC

M. Sumalatha, P. V. Naganjaneyulu and K. Satya Prasad

Abstract: Carry Select Adder (CSLA) is the best and effective adder utilized in digital signal processing to implement high-speed arithmetic applications. CSLA adder will solve fast arithmetic functions in multiple data processing methods. CSLA method is mainly used to diminish the power and area instead of using normal adder. This adder is influenced by many system structures to avoid the carry delay. The main intention of this paper is to use Binary to Excess-1 Converter (BEC) instead of Ripple Carry Adder (RCA) with Cin = 1 in the normal CSLA to get high-speed operations, small area, and low power utilization. Here, binary excess converter will become the number of minor logic gates when compared to n bit Full Adder (FA) structure. According to this deliberation, the delay of time also will be reduced. In this paper, the proposed BEC method will give the significant results with regard to reducing power and area. The CMOS process technology is implemented on 0.18 m custom design and layout.

Keywords CSLA · BEC · RCA

1 Introduction

In VLSI design process, the performance of the system, efficient area, and low power are considerable in recent research, which are used in many applications like robots, embedded systems, communication systems—Software-defined radios and biomedical instrumentation [1]. In digital signal processing, a multiplier and a adder play vital role in many applications. Hence, multipliers are moderately multifaceted circuits, which are usually operated at a high system clock rate.

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Multiplications are highly expensive and the overall operation will be slowed. Multiplication process requires single two-input adder to perform the arithmetic operation, which is having an arithmetic unit. Here, the sum of each one-bit position is added and this carry is transferred to the subsequently place. Finally, the transferred carry diminishes the adder speed. A perfect adder design really increases the performance of a multifaceted digital signal processing system. A Ripple Carry Adder (RCA) will be used for simple design and Carry Propagation Delay (CPD) is the major concern in this adder.

Carry look-ahead and Carry Select (CS) mechanisms are recommended to diminish the CPD of adders. The CSLA will be used to mitigate this problem [2]. CSA is one of the best adders having small area and low power utilization. It generates fractional sum and carry by conceding for carry input Cin = 0 and Cin = 1, and then the multiplexers will choose the last sum and carry. The main drawback of CSLA is larger area. It will be rectified by modified CSLA. The proposed structure of 16-bit regular SQRT (Square Root) CSLA has five distinct groups size of RCA with Cin = 1. Each one group contains Binary to Excess-1 Converter (BEC) and multiplexer [3]. The area evolutions have done by counting the total number of AOI gates. Here, the delay will be obtained by adding more number of gates in the highest lane of logic block.

2 Basic Structure of BEC Logic

A modified CSLA will use BEC. In this circuit, add1 is applied to the input numbers and the four-bit binary excess converter is shown in Fig. 1. The main theme of the proposed method is to get better addition speed with the minimum number of logic gates when compared to the Full Adder (FA) structure. The main significance of the BEC logic reduces the huge silicon area with large number of bits which are used in CSLA design [4–10].

BEC contains four inputs and the output is achieved by adding “1” with each of it. The prime intention of this exertion is to use binary excess converter instead of the RCA with Cin = 1 in order to diminish the area and power utility of the normal CSLA. To restore the n-bit RCA, an n+1 bit binary excess converter is needed. Figure 2 shows how the basic function of the CSLA is obtained by using 4-bit BEC collectively with the multiplexer. The four-bit input (B3, B2, B1, and B0) is applied to the input of 8:4 multiplexer and an extra input of the multiplexer is the BEC output.

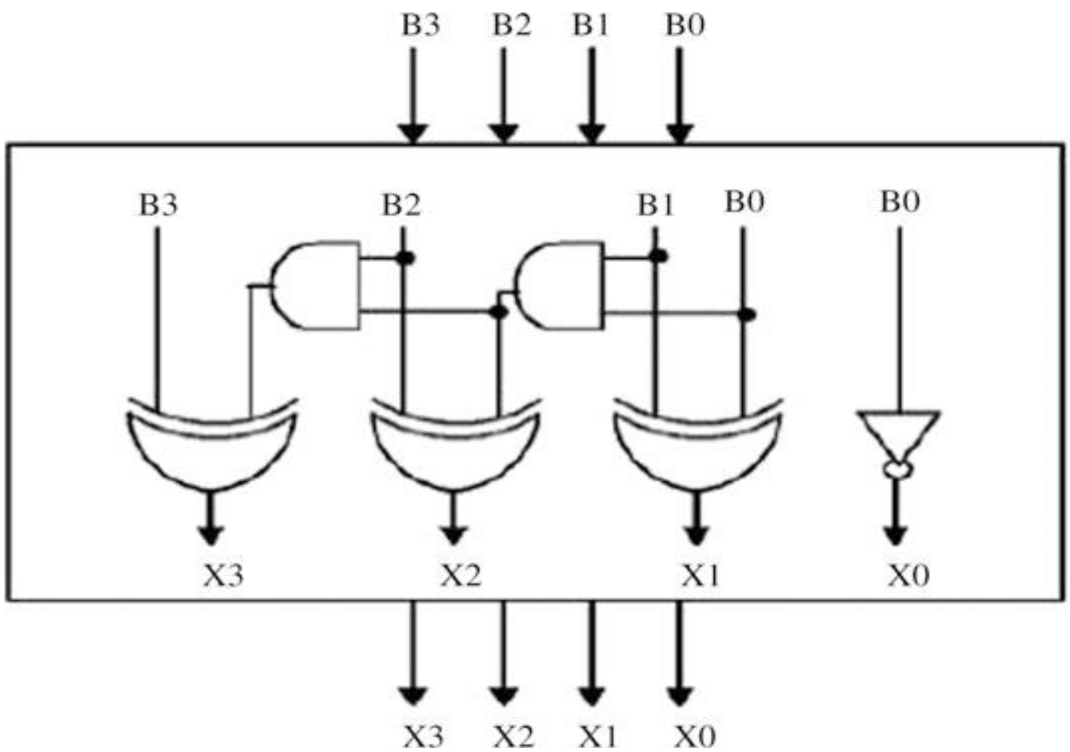
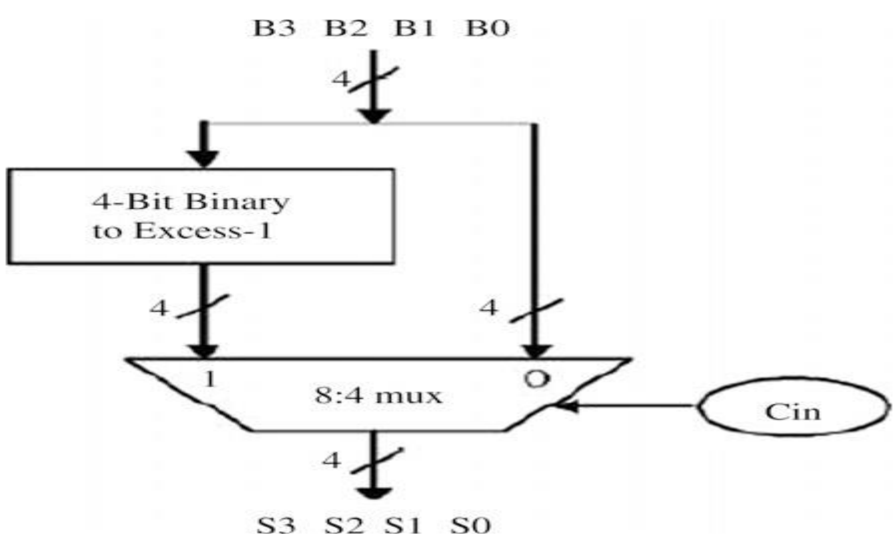


Fig. 1 BEC-1 convertor with four-bit

Fig. 2 Binary excess
Converter with 8:4 multiplexer



3 Area Estimation of CSLA Using BEC

The overall architecture of FIR filter is shown in Fig. 3, which consists of the coefficient ROM, data RAM, input data reader, clock generator, and a filter. The clock signal can be generated from the clock generator. The coefficient value can be stored in the coefficient ROM. The input data can be moved to the data RAM for storing purposes. To perform the filtering operation, we need coefficient ROM and data RAM.

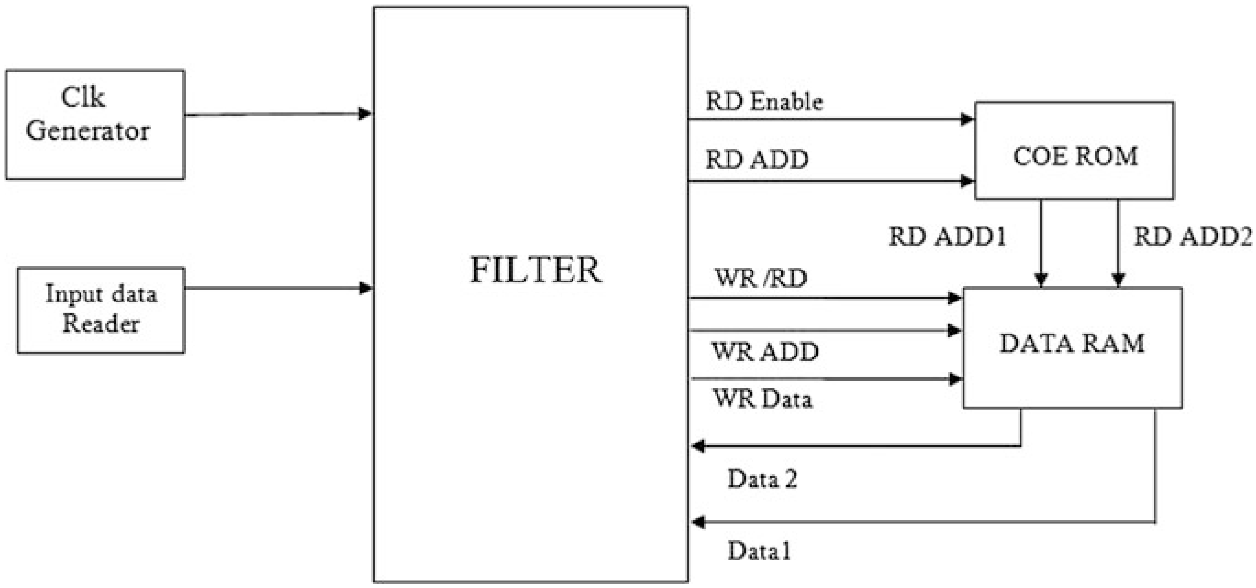


Fig. 3 Proposed FIR filter architecture

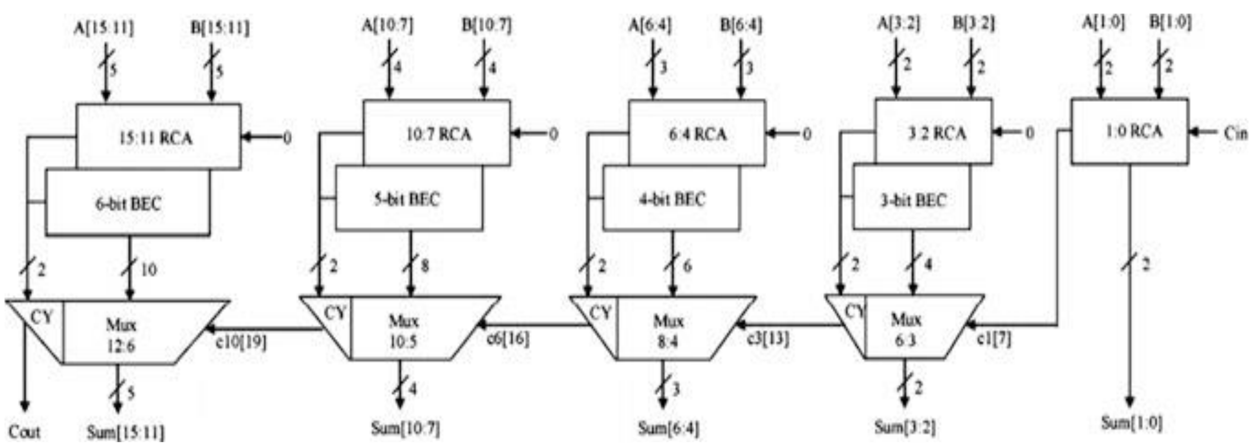


Fig. 4 Modified 16-bit CSLA

Here, the data unit can arrange the input data, and the following operation can be done in the above architecture. In the first stage, calculate the memory address and enable data RAM to store the input data. The second stage enables the coefficient ROM to perform the read coefficient one by one to get the filter results. Finally, the data RAM is enabled to get the filter coefficients. In that FIR filter, only digital adder can be caused to get the result. It occupies less area and power. The proposed structure uses 16-bit square root CSA with binary excess converter for RCA with Cin = 1 to reduce the area and power which is shown in Fig. 4.

In the proposed system, the two-bit RCA has one FA and one-half adder for Cin = 1, where three-bit binary excess converter is utilized which enhances one to the output from two-bit RCA. According to this deliberation, the time delay has been reduced. The output of the MUX is depending on the input of the MUX and BEC. The input arrival time is lesser than the multiplexer selection input arrival time. By selecting the BEC output or the straight inputs, there are two possibilities such as parallel and multiplexer rendering to the regulate signal Cin. While Designing CSLA, the area will be reduced based on the logic gates of RCA with BEC and multiplexer selection output, which leads to get less power consumption.

4 Results and Discussion

Table 1 and Fig. 5 show the comparison of the existing as well as proposed method by considering the parameters such as area, power, and delay. The performance of CSLA with BEC is implemented by using 0.18 m CMOS technology. In this table, we can observe that all the parameters are reduced when compared with the existing methods.

Table 1 Comparison of area, power, and delay for existing and proposed method for 180 nm CMOS technology

Design	Area (square meters)	Power (nw)	Delay (ps)
CSLA with BEC	159.040	5843.963	2188
REGULAR SQRT	195.200	6783.889	2188
CSLA RCA	151.012	6883.889	2195

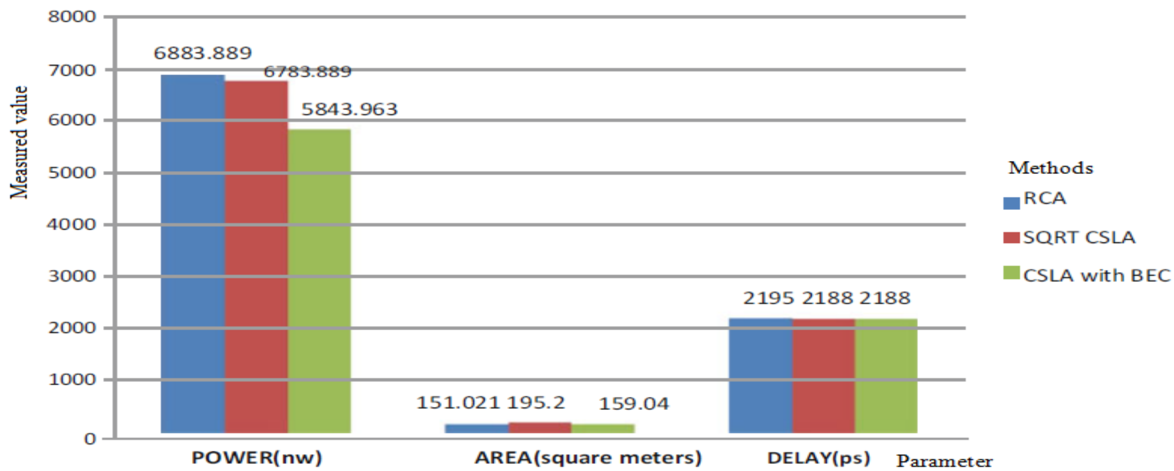


Fig. 5 Performance of CSLA with BEC and comparison with existing methods

5 Conclusion

In this paper, we have proposed new FIR filter architecture with the help of a clock generator, coefficient ROM, data RAM, and CSA with binary excess-1 converter to diminish the area, power, and also to improve the speed and performance of the VLSI system. The main approach is to reduce the area and power by using proposed modified CSLA architecture with less number of gates which makes it efficient VLSI implementation. Finally, the major parameter of VLSI implementation like area, power, and delay is reduced in the proposed system with the help of CSLA adder with BEC.

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Certificate

This is to certify that ~~Mr.~~/Ms./~~Prof.~~/~~Dr.~~ Sumalatha Madugula of JNTUK, Kakinada has participated in **3rd International Conference on Micro-Electronics, Electromagnetics and Telecommunications** (ICMEET - 2017). He / She presented a technical paper titled Low Power and Area Efficient FIR filter Implemenlātion using CSLA with BEC to be published by Springer LNEE.

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Structural And Spectroscopic Studies Of Lead Germinate Glass System Doped With CoO

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**Corresponding author: Email: gnaga9@gmail.com*

Abstract. GeO2-PbO glasses mixed with different concentrations of CoO were prepared. The samples were characterized by XRD, OA and DTA techniques. Optical absorption studies on the samples indicated that a considerable proportion of Co ions exist in Co3+ and/or Co2+ states. The variations observed as a function of mole % of CoO in all these studies were analyzed keeping in view of different oxidation states and environment of Co ions in the glass network. These studies helped to identify the stable glass of all the samples.
Keywords: GeO2 glasses: spectroscopic studies: optical absorption

1. INTRODUCTION

PbO is a heavy metal oxide. It has attractive optical proprieties when used in the glasses. PbO is an important glass modifier. Its very high atomic number raises the density of the glasses. Its modifying action in the glass network changes the structure of the glass material. It has dual role in the glasses as modifier and glass former [1]. Lead oxide glasses have high refractive index and relatively low melting points [2]. GeO2 based glasses find applications in the NIR technology, in laser devices and as light guiding cores of optical fiber [3]. GeO2 glasses are used in the making of solid electrolytes [4]. PbO-GeO2 glasses are wildly used in High speed optical switches, broad band optical amplifiers and non liner optical devices [5, 6]. PbO – GeO2 glasses consists of [GeO4] and [GeO6] units besides [GeO5] units and some of NBOs. When the modifier PbO is added to GeO2 network, it acts either as a network former or as a modifier; if Pb–O is ionic it acts as modifier or glass former if Pb–O is covalent. Because of high polarizability, the Pb2+ ion forms a stronger covalent bond with O2- ion [7].

Cobalt containing glasses are used in making nonlinear optical devices and laser modulators. Cobalt doped glasses are also useful for Q-switching instruments [8-11]. CoO can affect electrical, optical and magnetic properties of the substrate glass. CoO has two oxidation states Co2+ and Co3+. Co2+ is important state since it gives blue colored and pink colored glaze to the glass. The intensity of the colors rises with the concentration of Co2+ ions. Very less work was done on PbO-GeO2: CoO glasses. The aim of the present work is to investigate spectroscopic properties i.e OA and FTIR along with DTA and XRD characterization.

2. EXPERIMENTAL PROCEDURE

The chemical compositions of the synthesized glasses used in the present study are as follows:

C_0: 40 PbO–60 GeO_2

C_2: 40 PbO–59.8 GeO_2: 0.2 CoO

C_4: 40 PbO–59.6 GeO_2: 0.4 CoO

C_6: 40 PbO–59.4 GeO_2: 0.6 CoO

C_8: 40 PbO–59.2 GeO_2:0.8 CoO

C_{10}:40 PbO–59.0 GeO_2: 1.0 CoO

Analytical grade reagents of PbO, GeO_2 and CoO powders in suitable proportion are well grounded, homogenized mixtures were melted in silica crucible at 1100oC in PID controlled furnace. After 1hour bubble free liquid was found then poured in a brass mold and subsequently annealed at another furnace operated at 400°C for 2 hours to avoid air cracks then, finally required glass samples are formed. The X-ray diffraction patterns of the samples were recorded with Philips

Structural and spectroscopic studies of lead germinate glass system doped with CoO

Shaik Meera Saheb[1], R.Vijay[2], P. Ramesh Babu[2], G.Naga Raju[1*]

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[2]Department of Physics, Usha Rama College of Engineering & Technology, Telaprolu, AndhraPrdesh, India.

ABSTRACT

GeO_2-PbO glasses mixed with different concentrations of CoO were prepared. The samples were characterised by XRD, OA and DTA techniques. Optical absorption studies on the samples indicated that a considerable proportion of Co ions exist in Co^{3+} and/or Co^{2+} states. The variations observed as a function of mole % of CoO in all these studies were analysed keeping in view of different oxidation states and environment of Co ions in the glass network. These studies helped to identify the stable glass of all the samples.

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Results:

From the measured values of density and calculated average molecular weight M of the glasses, some physical parameters such as mean cobalt ion concentration Ni, mean cobalt ion separation Ri, and polaron radius Rp in the glass network evaluated and also presented in Table 1.

Table 1: Physical parameters of PbO-GeO_2: CoO glasses.

Glass	Density (g/cm^3)	Average molecular weight $\bar{M}$	Total cobalt ion concentration $N_i(10^{22}cm^{-3})$	Inter ionic distance of Co^{2+} ions r_i(Å)	Polaron radius r_p(Å)
C_0	5.56	182.60	---	---	---
C_2	5.86	181.92	0.5631	5.63	2.41
C_4	5.82	181.89	1.2523	5.34	1.92
C_6	5.78	181.72	2.4213	4.95	1.66
C_8	5.73	181.61	4.4172	4.62	1.51
C_{10}	5.70	181.42	4.8713	4.31	1.39

Fig 1 shows X-ray diffraction pattern of PbO-GeO_2 glasses, the absence of sharp Bragg peaks confirms the amorphous nature of the prepared glasses.

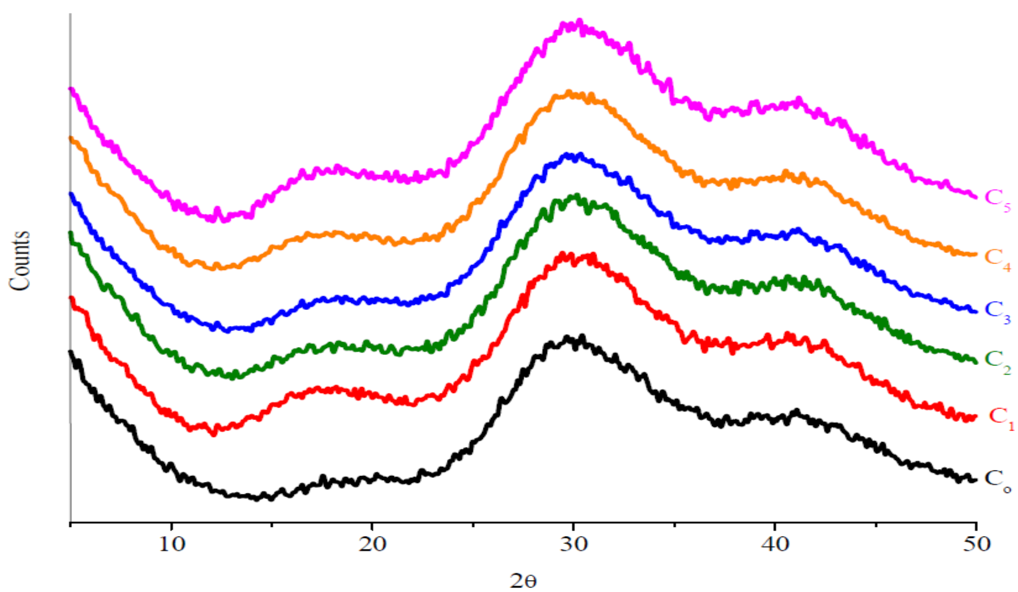

Fig.1: XRD pattern of PbO–GeO_2: CoO glasses.

Differential thermal analysis (DTA) thermo grams of all the samples are shown in Fig 2. A typical glass transition with midpoint (average of onset and end) in the range 560–535 ^{o}C, an exothermic peak of crystallization in the range 732–694 ^{o}C and an endo-thermic peak due to melting in the range 930–925 ^{o}C of the samples are observed from the DTA spectra and the relevant data is presented in the Table 2.

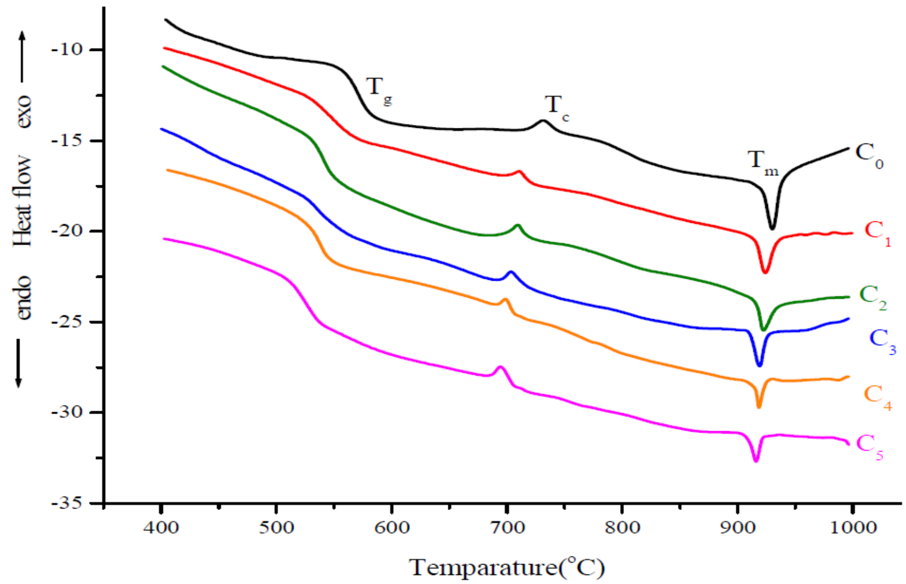

Fig. 2: DTA Traces of PbO- GeO_2: CoO glasses.

From Table 2, Tg, Tc are found to be maximum for C_0 sample and it is decreased with increase in the concentration of CoO.

Table: 2 DTA Parameters of Pbo-GeO_2: CoO

Sample	T_g (°C)	T_c (°C)	T_c - T_g (°C)
C_0	525	870	345
C_2	515	855	340
C_4	510	835	325
C_6	503	826	323
C_8	495	816	321
C_{10}	489	805	316

Fig. 3 shows Optical absorption spectra of PbO-GeO_2 glasses doped with CoO recorded at room temperature in the wave length region 200–1600 nm. Pure sample C0 shows two small peaks observed at 630 nm and 827 nm. The samples doped with CoO show two broad peaks in the visible region around 523 nm, 596 nm and another broad peak is observed in the NIR region at about 1423 nm. Besides these absorption bands a shoulder peak is noticed around 659 nm in all the samples (Fig. 3).

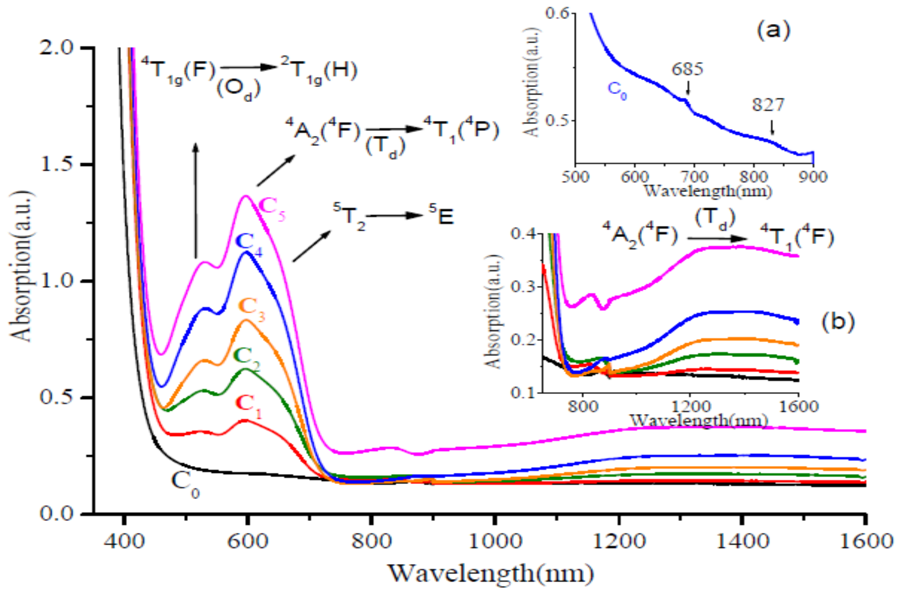

Fig. 3: Optical absorption spectra of PbO- GeO_2: CoO glasses.

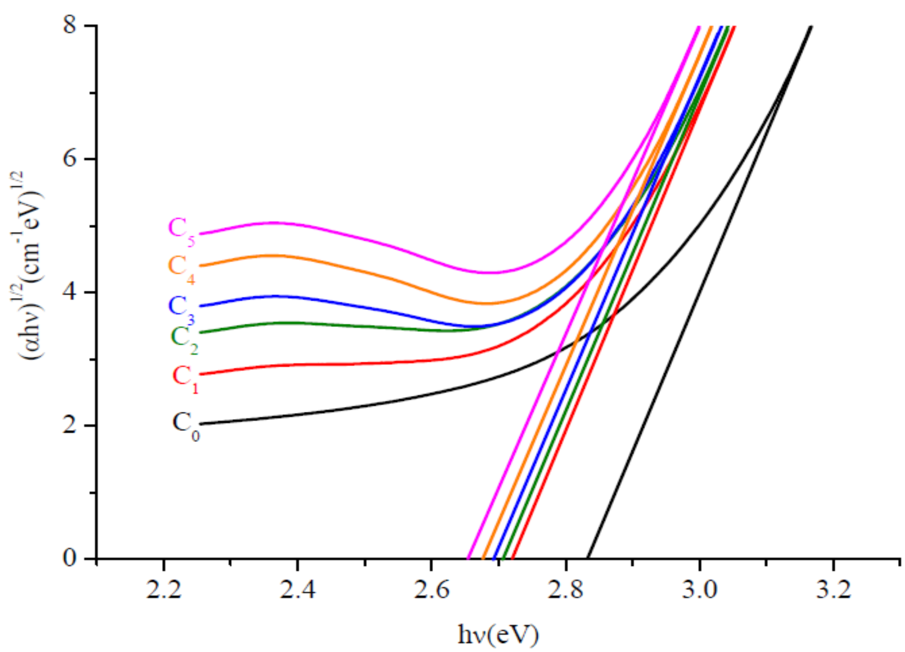

Fig. 4: Urbach plots for optical band gap of PbO- GeO_2: CoO glasses.

The UV absorption edge or cut off wavelength, kc of C_0 sample is observed at 378 nm. The cut off wavelength is found to be increased from C_0 to C_5 samples. From Tauc's plots, drawn between hm and (ahm)1/2 as shown in Fig. 4, optical band gap (Eg) of all the samples are determined by the extrapolation of the linear portion of the curve to the x-axis [(ahm)1/2 = 0]. The data pertinent to cut off wavelength (kc), band position and band gap (Eg) energies for the glasses under investigation are presented in Table 3.

Table 3: Data on optical absorption spectra of PbO-GeO_2: CoO glasses.

Sample	λ_c (nm) (±0.1)	Position of Band: Co^{2+} ions $^4T_{1g}(F)\rightarrow{}^2T_{2g}(H)$ (nm)	$^4A_2(^4F)\rightarrow{}^4T_1(^4P)$ (nm)	$^4A_1(^4F)\rightarrow{}^4T_1(^4F)$ (nm)	Co^{3+} ions $^5T_2 \rightarrow {}^5E$ (nm)	E_g (eV) (±0.001)	ΔE (eV) (±0.001)
C_0	386.0	---	---	---	---	2.834	0.1933
C_1	392.0	523.0	596.0	1434	663.5	2.722	0.1681
C_2	393.0	527.5	596.0	1449	663.0	2.709	0.1719
C_3	394.5	530.0	597.0	1440	664.0	2.692	0.1775
C_4	396.5	531.0	597.0	1425	664.0	2.678	0.1872
C_5	399.0	531.0	596.5	1419	663.0	2.655	0.1915

3. Discussion

In PbO-GeO_2: CoO glass System Germanium forms tetrahedral (GeO_4) and octahedral(GeO_6) units in the presence of Lead oxide (the modifier PbO).The corner oxygen is shared by GeO_4 tetrahedra.The bond length of Ge-O in GeO_4 tetrahedra is increased due to high electronegativity of lead.So three membered rings of GeO_4 tetrahedra are formed with compact void spaces around Pb ions. Germanium can also form GeO_5 units in the glass network (as per NMR studies). GeO_4 is shown to have linkages with PbO_4, PbO_2, PbO and PbO_6 structural units.

As the CoO is added in the glass network,the cross linking bonds Ge-O-Co,Ge-O-Pb and Co-O-Pb are formed.Co has two stable states Co or Co or both.There is possibility of reduction of Co into Co during melting annealing processes as per the equation

$$Co^{3+} + \bar{e} \longrightarrow Co^{2+}$$

The parameter density, N_i, R_i and R_p are evaluated using standard formulae and are tabulated in Table 1.The density of a material depends on ionic size atomic weight and presence of other elements. The density is observed to decrease while the molar volume increased with increase in CoO content. The reason is decrease in the concentration of Ge (heavier) and simultaneous increase in the Co (ligther) ions in the glass network. One more reason is formation of octahedral Ge ions than tetrahedral Ge ions in the glass composition. The decrease in density indicates decrease in compactness i.e addition of CoO opens the glass structure slightly [13].The other parameters (N,R and R) are used to understand insulating nature of the glass samples.

The values of T_g, T_c and T_c-T_g are found to be decreased with rise in CoO content. The decreasing values of glass forming parameters indicated higher thermal stability of the glasses. The decrease in bond length, closeness of packing and cross link density of structural units is reasons for such a fall in these parameters as the CoO content is increased. The DTA data suggests that the Co ions exists in Co^{2+} structural blocks occupying glass modifier positions that increase the cross link density and makes the bonds weaker, resulting in a less rigid glass network [14] .

The optical absorption (OA) Spectra have shown peaks at 519 and 589 nm belongs to $^4T_{1g} \rightarrow {^2T_{1g}}$ (H) transition and $^4A_2$ (^4F) $\rightarrow$ $^4T_1$ (^4P) transition of Co^{2+} ions respectively. A band in NIR region at 1423 nm is ascribed to $^4A_2$ (^4F) $\rightarrow$ $^4T_1$ (^4F) transition [15, 16] and a small hump at 659 nm is shown by $^5T_2 \rightarrow {^5E}$ transition (octahedral) of CO^{3+}[17]. With increasing CoO ion concentration. The area enclosed by tetrahedral bands is observed to be decreased while the area enclosed by octahedral bands is found to be increased. So we can infer that more and more Co^{2+} ions form octahedral sites with deformation by John – Teller effect [18] reducing the rigidity of glass structure.

The results of FTIR spectra of the glasses indicated the decreasing in intensity of GeO_4 Structural units and increasing in intensity of GeO_6 blocks of glass network as the concentration of CoO is increased [19] So one can infer that more Co ions occupy octahedral sites in the glass network and they acted as network modifier hence decreasing the rigidity of glass network as CoO content increased in the glass network [20]. So the modifying action of CoO has been established.

4. Conclusions:

Our study of PbO - GeO_2: CoO glasses for their spectroscopic and thermal properties had given the following conclusions.

1. There are no sharp Bragg peaks in XRD patterns which confirmed the amorphous nature of the glass specimens.
2. The decreasing Tg and Tc values calculated from DTA and decreasing density have shown that the glass forming ability decreased with increasing CoO content.
3. The optical absorption (OA) Spectra and FTIR disclosed the increase in the no. of octahedral sites of Co ions when CoO concentration is increased as a result some GeO_4 structural units are transformed in to GeO_6 units. The decreased rigidity of the glass network is the result of octahedral sites of GeO_6 structural units.

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This is to certify that Dr./Mr./Ms. SHAIK MEERA SAHEB SSIT Sathupalli Associate Professor has participated/presented a paper titled Structural and Spectroscopic Studies of Lead germanate glass System doped with CoO in the **Second two day National Conference on "Materials For Specific Applications"** held at Department of Physics, GRIET, Hyderabad, during 29th-30th January 2018.

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103. ANALYSIS OF MICROSTRIP ANTENNAS USING ANTENNA MEASUREMENT SYSTEM

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ABSTRACT

Microstrip antennas significantly used to transmit or receives electromagnetic waves at microwave region i.e., GHz frequencies. Compared with conventional antennas, microstrip patch antennas have additional advantages and improved prospects. They are lighter in weight, low size, low price, low profile, lesser in dimension and ease of fabrication. The Microstrip antennas can provide double and circular polarization, dual frequency operation, frequency agility, large bandwidth, feed line flexibility, beam scanning omni directional pattering.

In this paper we analyze the different types of microstrip antennas, with their parameters like radiation pattern, gain, directivity, resolution etc by using Antenna Measurement System (AMS).

Keywords: Microstrip antenna (MSA), Electromagnetic waves, Antenna Measurement system (AMS)

104. DESIGN, ANALYSIS AND IMPLEMENTATION OF ANNULAR RING TRIANGULAR MICROSTRIP PATCH ANTENNA

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