SECTION TOPIC NAME (see file “Subjects”)

**INCORPORATED EOSIN Y–GRAPHENE NANOCOMPOSITE: AN EFFICIENT VISIBLE LIGHTE ACTIVE PHOTOCATALYST**

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**Abstract**–A novel graphene supported Mn-doped eosin Y based nanocomposite has been successfully prepared by hydrothermal method. Eosin Y–grapheme nanocomposite acts uniquely as a metal free visible light photocatalyst without TiO2 or Bismuth Vanadate and incorporation of Mn further enhances the activity of the composite. Photocatalyst was active under visible light and photocatalytic activity strongly depends on pH of the degrading dye solutions.

**Keywords:**graphene oxide, reduced-graphene oxide, manganese, nanocomposite, photocatalyst, methylene blue, dye-degradation

Correct writing

is paid to green supercritical fluid (SCF)

from poly-D,L-lactide (PDLLA)

 the density functional theory (DFT), thermogravimetric (TGA/DTA)

mechanical activation (MA)

at temperature *T* = 293 K, *a* = 3.0553 Å,  *c* = 13.6459 Å,  *c*/*a* = 4.466

# effect 2*Tg* × *eg*

constant k = (9.6 ± 3.8) × 10−11 cm3 molecules–1 s–1

calcium aluminate C12A7 (12CaO ⋅ 7Al2O3)

at 500°C, at temperatures of 180 to 240°C, Θ = 157 and 153 K,  (1; 2.5%)

for 0.5–1 h, of φ ≤ +5 V, of *M*0 = 9, to 33 vol % at φ = 10

structurally ordered Bi2Se3 (0001)

of 1,1-diamino-2,2-dinitroethylene (FOX-7)

with nitrate [FeIII(3-OMe-Sal2trien)]NO3 ⋅ H2O(**I**)

of ceramic solid solutions CuCr1 *– x*Mg*x*O2 (*x* = 0–0.013)

Ni + Al mixtures

 the Mg–O–Al gel

of the reaction H + HN2 → HN2

carbohydrides TiC0.45H1.07–1.17 (the content of H2 is 1.97–2.17 wt %)

(30–70% H2 + 70–30% C2H6 (and C2H4))

between Ca 3*d* and O 2*p* orbits

atom on CH (001)

in the B3LYP/6-31G(*d*)

from 7.145 to 5.364 (eV)

INTRODUCTION

Major problem of the modern age is the environmental pollution such as water pollution, air pollution, land pollution and noise pollution etc. Among all these, water pollution is the main problem of the modern times, because of rapid industrialization age (such as paint, textile, cosmetics and food industries) that uses harmful chemicals such as dyes which are released into the water without any treatment. These dyes are very toxic to all life forms and are non-biodegradable [1]. Therefore, it is very important to degrade these industrial dye molecules before discharging into the water. For this purpose different conventional methods are being used to degrade organic dye molecules but these have proven to be ineffective [2]:

*Scheme 1.* Mechanism for synthesis of asymmetric PNS pincer ligand



In this work, novel eosin Y Mn doped reduced graphene oxide nanocomposites were synthesized by hydrothermal method and were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and scanning electron microscope/energy-dispersive X-ray spectroscopy (SEM/EDX).

Rout one: in first step thiol group attacked to carbon atom and next phosphorus group attacked in second step, rout two: in first step phosphorus group attacked to carbon atom and next thiol group in second step (Scheme 1). The optimized structures of the TSs as well as lithium diisopropylphosphanide and sodiumthiolates were atracked are depicted in Fig. 1 and 2, respectively.

According to data, in the first step, lithium diisopropylphosphanide attacked to carbon atom ∆*G*1≠ and *k*1 are 26.05 kcal/mol and 4.86 × 10-7 s–1, respectively. But when, the sodiumthiolates are said in Table 1 attracked to precursor, the rate constant is highest than lithium diisopropylphosphanide. In the second step, at rout 1 we assumed that thiols such as ethanethiol, (4-aminophenyl)methanethiol, and propane-2-thiol fixed and lithiumdiisopropylphosphanide was attacked to carbon atom.

EXPERIMENTAL

*Materials*

All chemical reagents such as graphite powder, sulfuric acid, KMnO4, H3PO4, N2H4, NaBH4, KOH and H2O2 were purchased from Dae Jung South Korea and were used without further purification (Fig. 3a–3c).

*Preparation of reduced graphene oxide*

Graphene based catalyst were prepared by Hummer’s method which is highly productive, cost effective, energy saving and fuel efficient [3]. The BSA with 98% purity; from Sigma-Aldrich, Germany; was dissolved in 20 mM sodium phosphate buffer (mix two solution of Na2HPO4 and NaH2PO4) at pH = 7.40 and stored in dark at 4ºC. The concentration of the BSA was determined spectrophotometrically considering the extinction coefficient of 43824 M–1 cm–1 at 280 nm [4].

For fluorescence titration experiments, BSA solution (2.5 ml, 7 μM in 20 mM sodium phosphate buffer pH = 7.40) in a quartz cuvette was titrated with various amounts of 0.1 mM solution of both monoazo dyes (Fig. 2a). The fluorescence intensity of BSA with the inner filter effect is corrected using the following Eq. 1 [5]:

, (1)

where σ1 is the corrected fluorescence intensity and σ2 is the observed fluorescence intensity in experiment, θ1 and θ2 are the totality of the absorbance of all components at the excitation wavelength (τ).

CONCLUSIONS

Eosin Y–Mn/RGO nanocomposites were fabricated by simple hydrothermal method.

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**Table 1.** Evaluation results of drilling fluid rheological properties

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Additives | AV,  mPa ∙ s | PV,  mPa ∙ s | YP/Pa,  Pa/mPa ∙ s | YP/PV,  Pa/mPa ∙ s | Ρ,  g/cm3 | FL,  mL | μ |
| Blank | 4.95 | 2.8 | 2.1793 | 0.7848 | 1.008 | 13.7 | 0.0524 |
| 0.1% ASS-8 | 7.50 | 3.5 | 4.0880 | 1.1680 | 1.015 | 17.9 | 0.0342 |
| 0.3% KD-03 | 4.9 | 2.8 | 2.1462 | 0.7665 | 1.018 | 11.0 | 0.0875 |
| 0.1% ASS-8 + 0.3% KD-03 | 9.7 | 4.4 | 5.4166 | 1.2310 | 1.021 | 13.7 | 0.1051 |
| 0.1% PAM | 8.0 | 4.2 | 3.8836 | 0.9247 | 1.022 | 12.0 | 0.0699 |
| 0.1% ASS-8 + 0.1% PAM | 12.0 | 3.6 | 8.5848 | 2.3847 | 1.024 | 22.4 | 0.0699 |
| 1.0% Modified starch | 6.0 | 4.0 | 2.0440 | 0.5110 | 1.022 | 7.5 | 0.0699 |
| 0.1% ASS-8 + 1.0% Modified Starch | 11.9 | 4.8 | 7.2562 | 1.5117 | 1.030 | 6.2 | 0.0612 |

**Table 2.** Corrosion rate and inhibitor efficiencies for various

concentrations of aniline/N,N-dimethylaniline in 5% HCl at 303 K

|  |  |  |  |
| --- | --- | --- | --- |
| Inhibitor | Concentrations,  g · L–1 | *Wcorr,*  g · m–2 · h-1 | *Ew*,% |
| Blank | 0 | 2.43 | – |
| Aniline | 0.1 | 1.89 | 22.3 |
| 0.5 | 1.38 | 43.2 |
| 1.0 | 0.98 | 59.7 |
| 1.5 | 0.94 | 61.3 |
| 2.0 | 0.90 | 63.0 |
| N,N-dimethylaniline | 1.0 | 1.93 | 20.6 |
| 1.5 | 1.81 | 25.5 |
| 2.0 | 1.74 | 28.4 |

**Table 3.** The calculated values of Δ*G*2≠ and *k*2 for synthesis of asymmetric PNS pincer ligand in secondary step

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rout 2 | | | | Step two |  | Rout 1 | | | | Step two |
| *T*∆S≠, kcal/mol | ∆H≠, kcal/mol | K2, s–1 | ∆*G*2≠, kcal/mol | RSNa attacked | *T*∆S≠, kcal/mol | ∆H≠, kcal/mol | K2b, s–1 | ∆*G*2≠, kcal/mol | PiPr2Li attacked |
| **–24.628** | **24.629** | **1.25** **∙** **10+12** | **0.95** | **Ethanethiol** | **–14.65** | **+16.94** | **2.97** **∙** **10+14** | **–2.29** | **Ethanethiol** |
| –24.624 | 24.629 | 2.22 ∙ 10+12 | 4.7 | Propane-2-thiol | **14.24** | **16.17** | 3.08 ∙ 10–10 | 30.41 | Propane-2-thiol |
| 14.43- | +9.96 | 3.27 ∙ 10+9 | 4.47 | (4-Aminophenyl)methanethiol | 96.633 | +96.635 | 1.82 ∙ 10+14 | –2.00 | Cyclopentanethiol |

Captions for figures to the article Ahmad Ali Kashmeri et al.

**Fig. 1.** Langmuir’s adsorption plots for steel in 5% HCl containing different concentrations of aniline/N,N-dimethylaniline at different temperature. (a) Aniline: (*1*) 303 K, (*2*) 323 K, (*3*) 343 K; (b) diphenilamine; (*1*) 303 K, (*2*) 323 K, (*3*) 343 K.

**Fig. 2.** The screening of the concentration of inhibitor: (*1*) 0.1% ASS-8, (*2*) 0.3% ASS-8, (*3*) 0.4% ASS-8, (*4*) 0.5% ASS-8, (*5*) 1% ASS-8, (*6*) 1.5% ASS-8, (*7*) 4% KCl, (*8*) distilled water.

**Fig. 3.** The effect of ASS-8 concentration on anti-swelling rate.

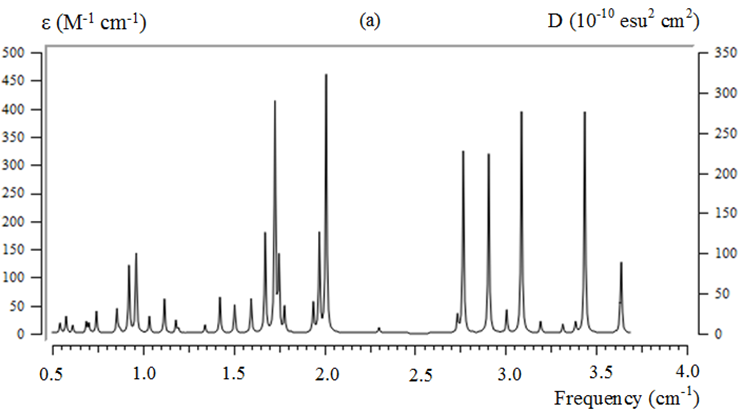
**Fig. 4.** The distribution of clay particle size in different suspensions: (*1*) un-hidrated + 0.2% ASS-8, (*2*) hidrated + 0.2% ASS-8, (*3*) un-hidrated, (*4*) hidrated.

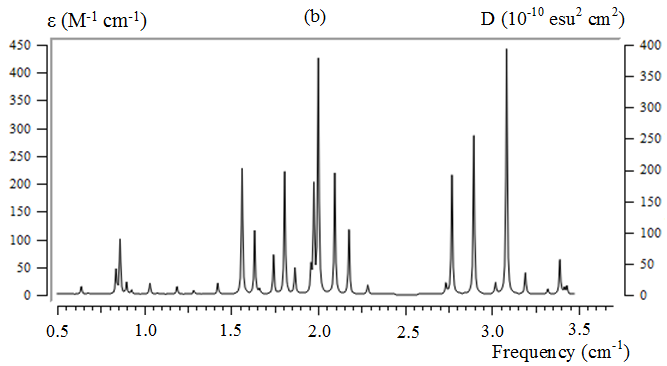
**Fig. 5.** The TGA of the bentonite treated with different methods: (*1*) ASS-8, (*2*) blank.

**Fig. 6.** UV patterns of SO series: (*1*) represents SO, (*2*) represents SO-1, (*3*) represents SO-2, (*4*) represents SO-3, (*5*) represents SO-4).

**Fig. 7.** (a) TSs structures in first step for, (b) ethanthiol, propane-2-thiol: (*1*) (4-aminophenyl)methanethiol, (*2*) (4-nitrophenyl)methanethiol and second step for, (*3*) ethanthiol, (*4*) propane-2-thiol.

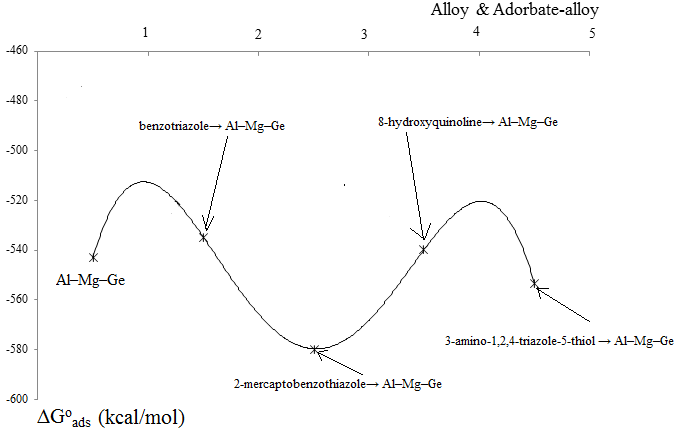
In this sample, the figures do not correspond to the captions to the figures. The drawings themselves are samples of design.

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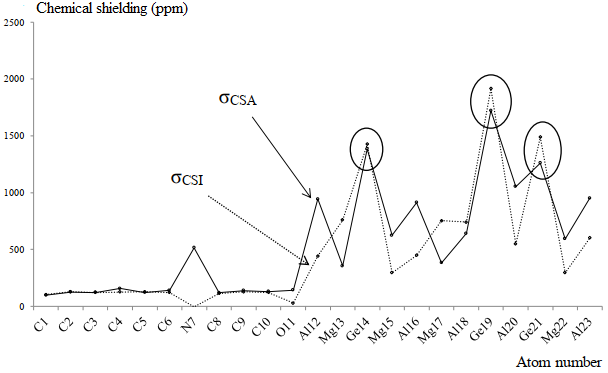
**Fig. 1**

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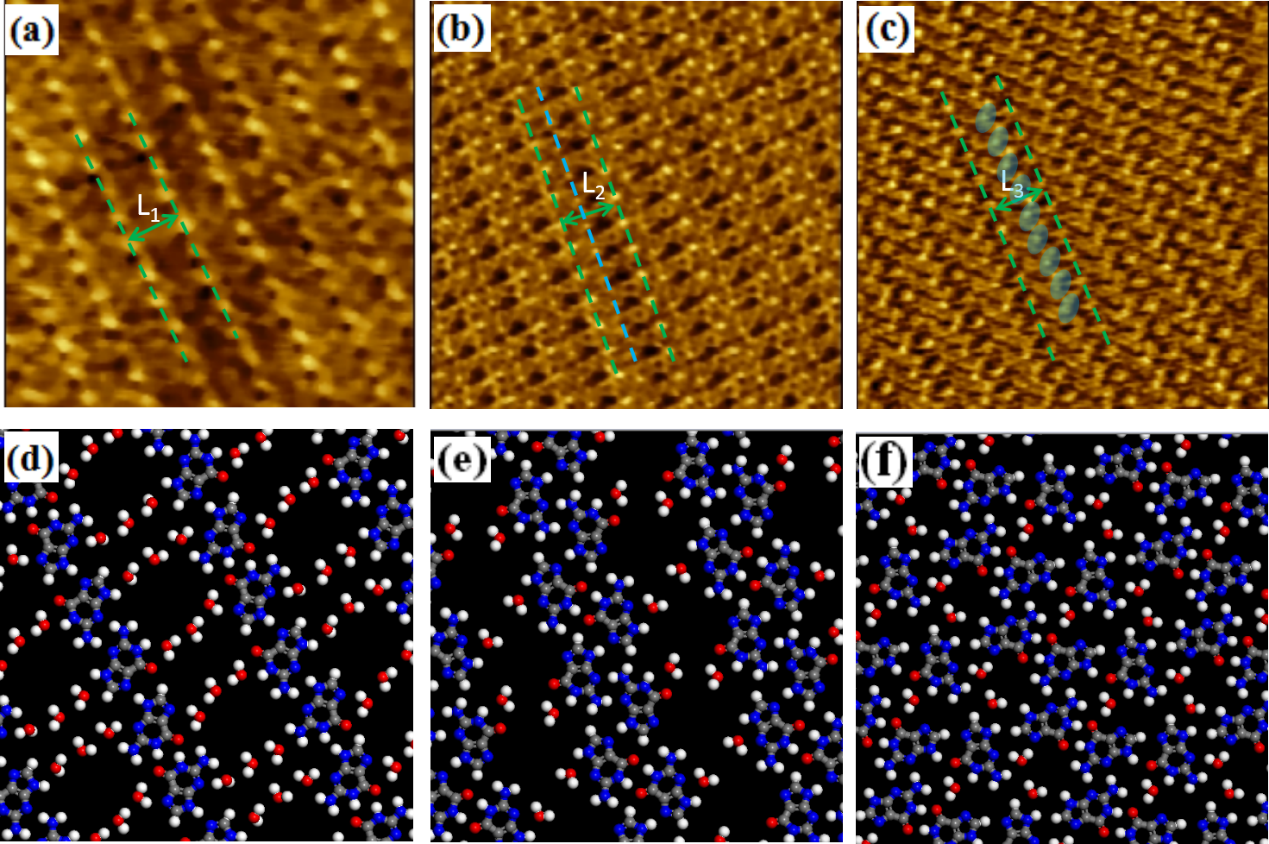
**Fig. 2**

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**Fig. 3**

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**Fig. 4**

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127 LUMО (*Е* = –0.19347 еV)

**(24)**

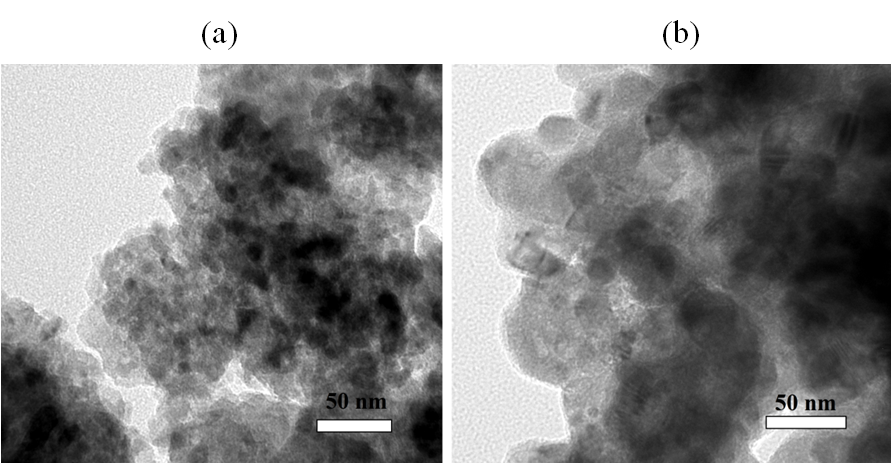
**Fig. 4.**

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**Fig. 5**

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**Fig. 6**

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**D:\SSB PEN DRIVE\RESEARCH DATA upto 12.02.2023\PHD DATA\PEN DRIVE PROCESSED DATA\Paper on Esters\GRAPHS\Black & White diagrams on 20.03.2023\7.tif**

**Fig. 7**

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1

*L*

*p*1 – *w*

*p*2 – *w*

*p*1 – *w*

*w*

*w*

*p*2 – *w*

*w*

*w*

Lane 1

Lane 2

α

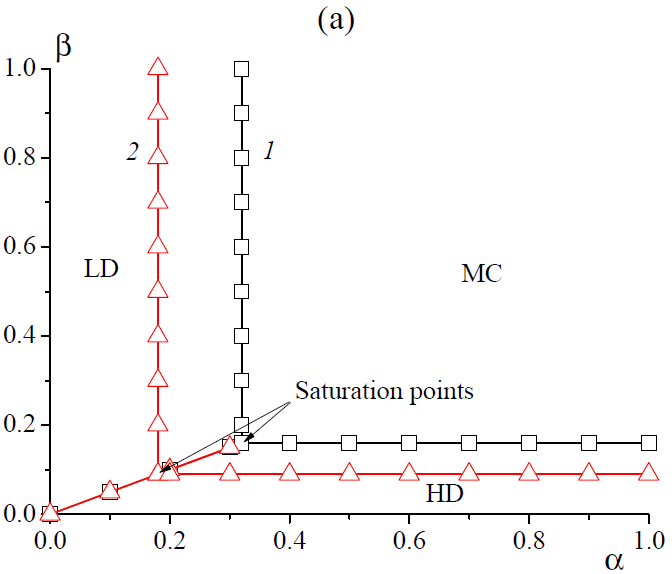
α

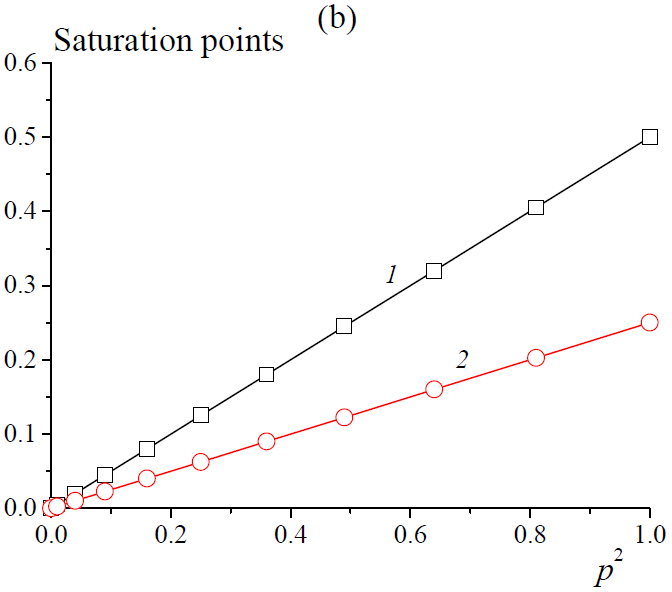
β

β

**Fig. 8**

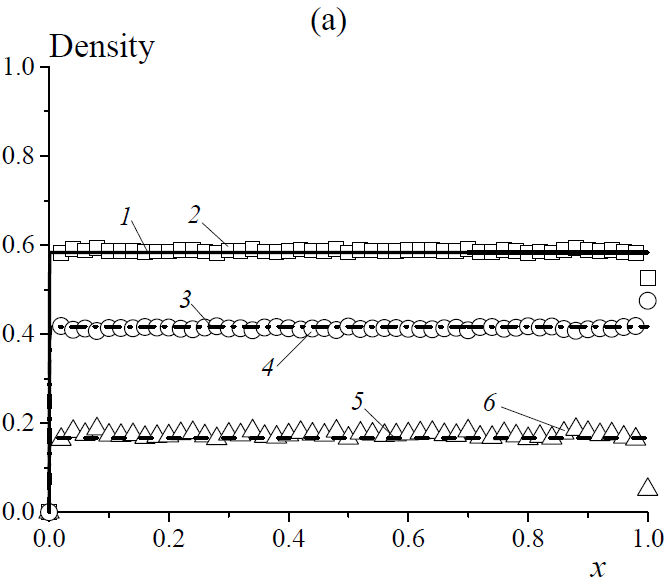
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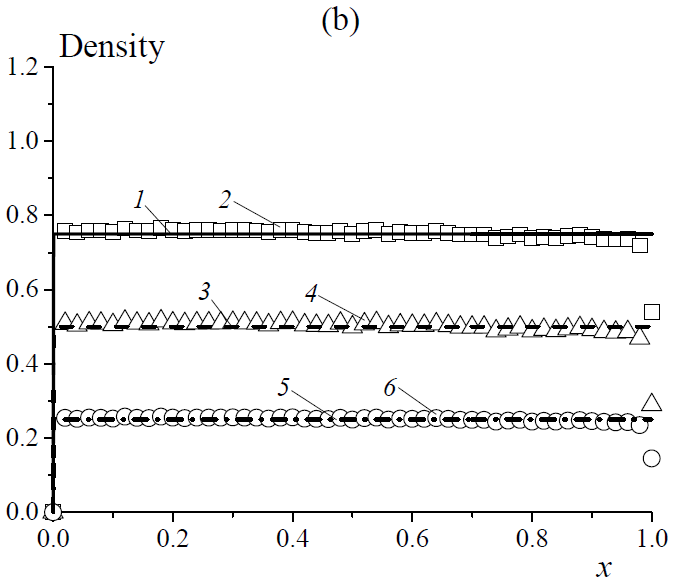


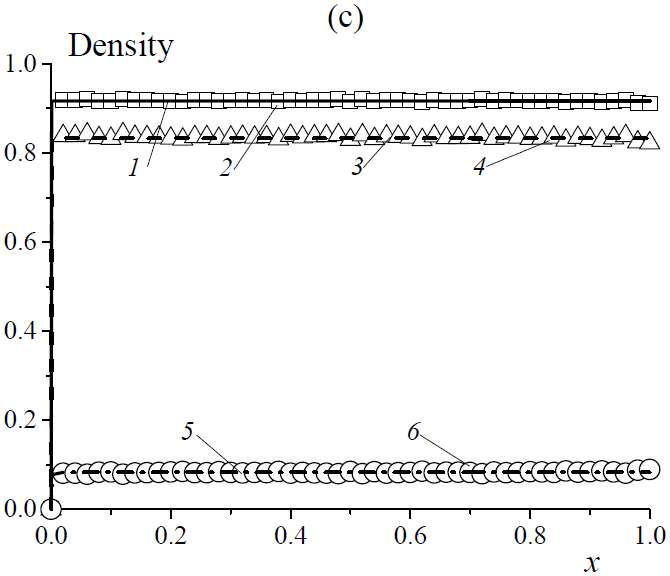


**Fig. 9**

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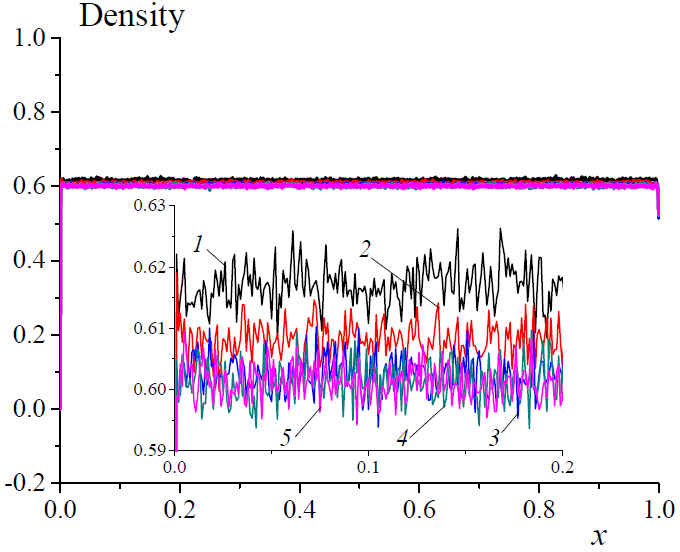






**Fig. 10**

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**Fig. 11**

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