



70th anniversary of *Acta Chimica Slovenica*

Dear readers of *Acta Chimica Slovenica*,

In this year *Acta Chimica Slovenica*, the journal published by Slovenian Chemical Society, is celebrating 70th anniversary. Already in 1951 *Kemijski zbornik* was published as a kind of its predecessor and already then, its editors expressed the wish to launch a scientific journal. However, the first volume appeared only in 1954 as *Vestnik Slovenskega kemijskega društva* (*Bulletin of the Slovenian Chemical Society*). Several renowned Slovenian scientists have served as editors and the journal was developing international recognition. Several milestones have to be mentioned that had crucial influence on the development of *Acta Chimica Slovenica*. In 1978 (vol. 25) a new editorial board with Drago Kolar as the editor, Marko Razinger as the technical editor and Branko Stanovnik as the chairman of the editorial board started to publish *Vestnik Slovenskega kemijskega društva* on a regular basis as four issues per year. They also started to



publish review articles and plenary lectures delivered at symposia and congresses organized by the Slovenian Chemical Society as well as special issues dedicated to prominent chemists. In 1993 (vol. 40) the name of the journal was changed to *Acta Chimica Slovenica*. In 1998 two major steps were achieved by the editor Andrej Petrič - alongside with the printed version of articles also electronic version was published and *Acta Chimica Slovenica* started to be indexed in Web of Science. Two years later, in 2000, *Acta Chimica Slovenica* obtained its first impact factor. The journal further developed under the editors Janez Košmrlj, Aleksander Pavko and Ksenija Kogej. Under their leadership modern information technologies have been fully employed enabling the transition from the printed to the electronic articles, greatly facilitating the accessibility of the journal, thus increasing the international reach of the journal and, of course, significantly increasing the impact of scientific papers published in *Acta Chimica Slovenica* on the development of chemistry, chemical engineering, biochemistry, chemical education and other related disciplines. The broad international coverage of the journal due to the free access of the online articles and due to the indexing in various scientific databases such as Web of Science, PubMed, CrossRef, Chemical Abstract Plus, Scopus, SciFinder (CAS), Portico and others, as well as due to introduction of DOI numbers, have enabled *Acta Chimica Slovenica* to establish a strong presence in the international scientific community. The quality of the journal's publications is also demonstrated by the fact that the most cited articles published in the time span 1998–2023 have more than 200 citations. Many years of dedicated work of the editors and editorial boards, the strong support provided by the Slovenian Chemical Society and the support of Slovenian universities, faculties and institutes have enabled 70 years of development and progress in the field of publishing the Slovenian scientific journal *Acta Chimica Slovenica*. This has given the journal an excellent platform for further activities. It was a great privilege for me to serve *Acta Chimica Slovenica* for many years as co-editor in the field of Inorganic Chemistry and to become Editor-in-Chief in January 2023 at the beginning of the 70th anniversary of our journal.

The contribution of *Acta Chimica Slovenica* and Slovenian Chemical Society as its publisher to the scientific community can be assessed by data accessible in Web of Science. These data are available since the year 1998 when *Acta Chimica Slovenica* started to be indexed in Web of Science. We can see interesting transition and development of the journal. In the period 1998–2001, *Acta Chimica Slovenica* published between 40 and 50 articles per year (WoS statistics include scientific and professional articles), however, by 2002 the number of articles per year had almost doubled (Figure 1). The number of articles published additionally increased in 2007, when 132 articles were published, about three times as many as in 1998. The number of articles published annually since 2007 has fluctuated around 120, with the highest number of articles published in 2008 (146 articles) and the lowest number in the last year, when 94 articles were published. The number of citations has also increased markedly since 1998, confirming the international relevance and importance of the scientific results published in the journal (Figure 1).

International involvement can also be monitored by the proportion of publications by foreign authors. In the period 1998–2022, the journal published papers having authors from 89 countries. Slovenian authors contributed

the majority of the articles to *Acta Chimica Slovenica* during this period (35.3%), followed by the authors from Iran (11.2%), China (6.8%), India (6.7%), Turkey (6.4%) and Croatia (4.1%) (Figure 2). Between 2% and 4% per country were contributed by the authors from Egypt, Romania, Serbia, the Czech Republic, the USA and Germany. Between 1 and 2% per country were contributed by the researchers from Poland, Bulgaria, France, Pakistan, Ukraine, Italy, Slovakia, Hungary and Austria. Less than 1% per country came from the 68 countries, representing a total of 17.3%.

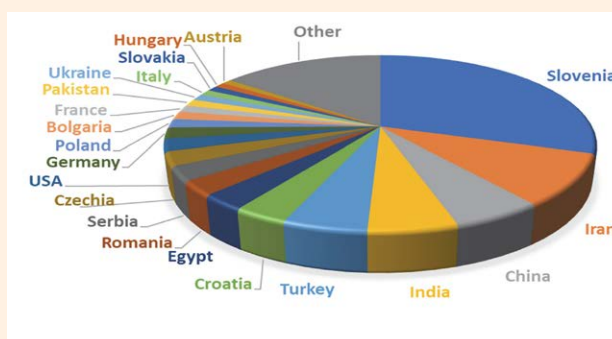


Figure 2: Publication shares by country.

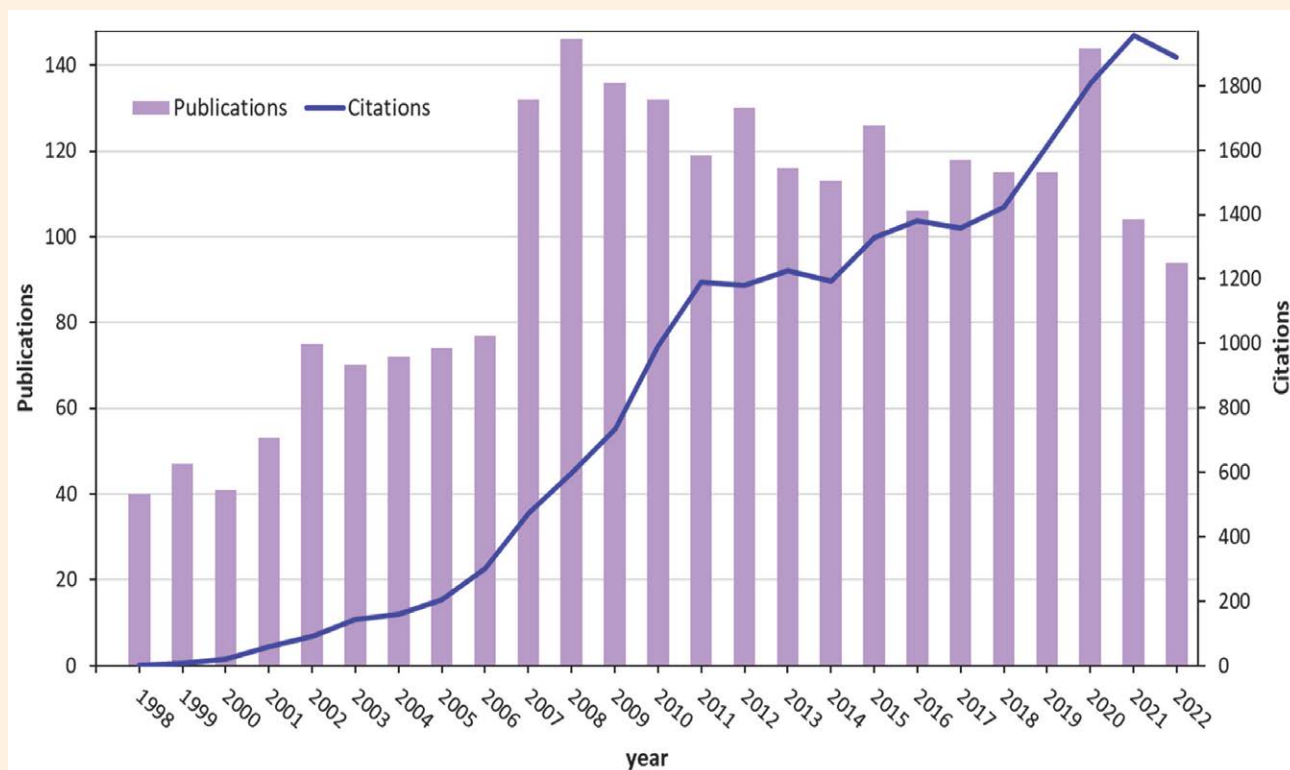


Figure 1: Number of publications in *Acta Chimica Slovenica* and number of all citations per year.

A breakdown by the continent shows that during the period 1998–2022, contributions from Europe dominated (69.3%), followed by those from Asia (37.6%), Africa (5.9%), the Americas (4.8%), and Australia and Oceania (0.7%) (Figure 3).

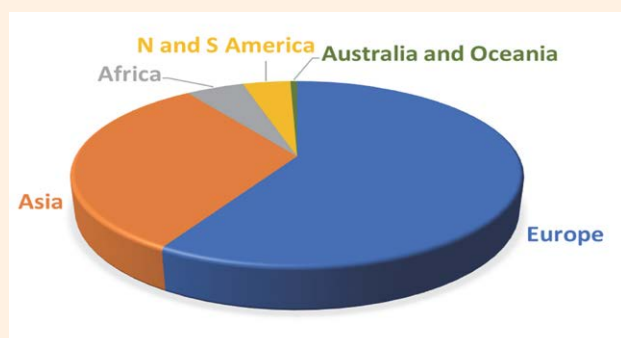


Figure 3: Publication shares by continent.

The free online access of articles and indexing of the journal content in the most important scientific databases are the cornerstones of international accessibility, making the content available to all researchers worldwide thus creating opportunities for the visibility of the research published. *Acta Chimica Slovenica* fulfils all these conditions and thus enables authors to disseminate their results efficiently. We can clearly see that articles published in *Acta Chimica Slovenica* can achieve international visibility and recognition in the scientific community as demonstrated by many highly cited articles in our journal. Below follow short presentations of the articles published in the time period 1998–2022 that received more than 100 citations.

The two most cited articles in *Acta Chimica Slovenica* in the time period 1998–2022 have both 232 citations (data access December 5th 2023). Article entitled *Characterization of phenol-formaldehyde prepolymer resins by in line FT-IR spectroscopy* published in 2005 by Slovenian authors I. Poljanšek and M. Krajnc reports on different resol phenol-formaldehyde prepolymer resins synthesized with different formaldehyde/phenol ratios. The phenolic resin composition depends on monomer ratio, catalyst, reaction conditions, and residual free monomers. Temperature and pH conditions under which reactions of phenols with formaldehyde are carried out have a profound effect on the characteristics of the resulting products. Three reaction sequences must be considered: formaldehyde addition to phenol, chain growth or prepolymer formation and finally the cross linking or curing reaction. Two prepolymer types are obtained depending on pH, novolacs in an acidic pH region whereas resols

by alkaline reaction. Resol resins are synthesized with a molar excess of formaldehyde ($1 < F/P < 3$). These are mono- or polynuclear hydroxymethylphenols which are stable at room temperatures, but are transformed into three dimensional, cross linked, insoluble and infusible polymers by the application of heat. An ATR-FTIR spectrometry technique (ReactIR 4000) with light conduit and diamond-composite sensor was used to perform in-line monitoring of phenol-formaldehyde prepolymer synthesis. This technique was found to be ideal for determining residual free phenol and formaldehyde, individual phenol and formaldehyde conversions and prepolymer composition changes as a function of time when the condensation reaction was carried out. The kinetics data obtained through the ReactIR 4000 in-line reaction analysis system agreed well with those determined by the traditional titration method. ReactIR technology replaces time consuming and inaccurate off-line methodology (*Acta Chim. Slov.* **2005**, 52, 283–244).

Another contribution with the same number of citations entitled *Biodegradation of malachite green by Kocuria rosea MTCC 1532* published in 2006 by Indian authors G. Parshetti, S. Kalme, G. Saratale and S. Govindwar reports on completely decolorized malachite green under static anoxic condition within 5 h by bacteria *Kocuria rosea* MTCC 1532; however decolorization was not observed at shaking condition. *K. rosea* have also shown decolorization of azo, triphenylmethane and industrial dyes (cotton blue, methyl orange, reactive blue 25, direct blue-6, reactive yellow 81, and red HE4B). Semi-synthetic media containing molasses, urea and sucrose have shown 100, 91, 81% decolorization respectively. Induction in the activities of malachite green reductase and DCIP reductase was observed during MG decolorization suggesting their involvement in the decolorization process. UV-Visible absorption spectrum, HPLC and FTIR analysis showed degradation of MG. Toxicity study revealed the degradation of MG into non-toxic products by *K. rosea* (*Acta Chim. Slov.* **2006**, 53, 492–498).

The third most cited contribution with 152 citations entitled *Equilibrium sorption study of Al^{3+} , Co^{2+} and Ag^+ in aqueous solutions by fluted pumpkin (*Telfairia occidentalis* HOOK f) waste biomass* was published in 2005 by Nigerian authors M. Horsfall Jnr and A. I. Spiff. Authors combined an ensemble of equilibrium sorption techniques to study the influence of ionic radius on the sorption characteristics of Al^{3+} , Co^{2+} in Ag^+ by fluted pumpkin waste biomass. The experimental results were analyzed in terms of five two-parameter adsorption isotherm equations-the Langmuir, Freundlich, Temkin, Dubinin-Radushkevich and Flory-Huggins isotherms. According to the evaluation us-

ing Langmuir equation, the monolayer sorption capacity obtained was 16.98 mg/g, 10.34 mg/g and 8.03 mg/g for Al^{3+} , Co^{2+} in Ag^+ respectively. The data further showed that, the Freundlich and Langmuir isotherms described the data appropriable than Temkin, Dubinin-Radushkevich and Flory-Huggins isotherms. The result showed that fluted pumpkin waste could be used for the removal of Al^{3+} , Co^{2+} in Ag^+ from wastewater and ionic radius influences the rate of metal ion migration to the biomass surface and the adsorption intensity of the metal (*Acta Chim. Slov.* **2005**, 52, 174–181).

The fourth contribution with 139 citations entitled *Kinetics and mechanism of reactive red 141 degradation by a bacterial isolate Rhizobium radiobacter MTCC 8161* was published in 2008 by Indian authors A. Telke, D. Kalyani, J. Jadhav and S. Govindwar. Authors isolated a bacterium *Rhizobium radiobacter* MTCC 8161 from effluent treatment plant of textile and dyeing industry of Ichalkaranji, India. The bacterial isolate *Rhizobium radiobacter* MTCC 8161 was capable of decolorizing various azo, triphenylmethane (TPM), disperse and reactive textile dyes with decolorizing efficiency varying from 80–95%. This strain decolorized (90%) a deep red sulfonated diazo dye Reactive Red 141 (50 mg/L) with 0.807 mg of dye reduced/g of dry cells/h of specific decolorization rate in static anoxic condition at optimum pH 7.0 and temperature 30 °C with 83.33% reduction in COD. The degradation efficiency of this strain using urea and yeast extract showed fast decolorization among different carbon, nitrogen source. The induction of various oxidative and reductive enzymes indicates involvement of these enzymes in color removal. Phytotoxicity studies revealed less toxic nature of decolorized products (1000 mg/L) as compared to original dye. FTIR spectroscopy and GC-MS analysis indicated naphthalene diazonium, *p*-dinitrobenzene and 2-nitroso naphthol as the final products of Reactive Red 141 (*Acta Chim. Slov.* **2008**, 55, 320–329).

A contribution with 132 citations entitled *Evaluation of the hydration of Portland cement containing various carbonates by means of thermal analysis* was published in 2006 by Slovenian authors R. Gabrovšek, T. Vuk and V. Kaučič. Authors report on hydration of portland cement containing a fixed amount of mineral admixtures (calcium carbonate or dolomite or magnesite) at 60 °C for 7- and 28 days. Phase compositions were evaluated by thermogravimetric analysis and by powder X-ray diffraction. Measurements of surface area indicated the development of the hydrated microstructure. Detailed analysis of DTG decomposition profiles of portlandite and carbonate enabled the evaluation of certain admixture-related parameters concerning portlandite formation and also indicated the

behavior of specific carbonates during the hydration process (*Acta Chim. Slov.* **2006**, 53, 159–165).

A contribution with also 132 citations entitled *A comparative study of several transition metals in Fenton-like reaction systems at circum-neutral pH* was published in 2003 by Slovenian authors M. Strlič, J. Kolar, V.-S. Šelih, D. Kočar and B. Pihlar. Authors used *N,N'*-(5-nitro-1,3-phenylene)bisglutaramide hydroxylation assay for spectrophotometric determination of the rate of oxidising species generation in Fenton-like systems to obtain comparative data for Cd(II), Co(II), Cr(III), Cu(II), Fe(III), Mn(II), Ni(II), and Zn(II). The pH range of interest was 5.5–9.5 and was controlled by addition of an appropriate phosphate buffer. The temperature of the reaction mixture was controlled in the range 25–80 °C. The rates of production of oxidising species at pH 7 decrease in the following order: Cu(II) > Cr(III) > Co(II) > Fe(III) > Mn(II) > Ni(II), while Cd(II) and Zn(II) did not exhibit any catalytic activity and Ni(II) only led to a significant production of oxidising species at pH > 7.5. In mixtures of Cu(II) and Fe(III) the rate of oxidising species production may be considered as the sum of contributions of individual metals. This was not the case of a mixture containing additional small amounts of Zn(II), Co(II) and Mn(II). The later two had strong pro-oxidative effects, the addition of Zn(II) had an anti-oxidative effect. Apparent activation energies for oxidising species generation are in the range 75–110 kJ mol⁻¹, and decrease in the following order: Cu(II) > Ni(II) > Mn(II) > Fe(III) > Co(II) (*Acta Chim. Slov.* **2003**, 50, 619–632).

A contribution with 120 citations entitled *Application of polyaniline and its composites for adsorption/recovery of chromium(VI) from aqueous solutions* was published in 2006 by an Iranian author R. Ansari. The paper deals with adsorption of Cr(VI) from aqueous solutions using sawdust coated by polyaniline (SD/PAN) and polyaniline composites with nylon 66 and polyurethane. Nylon and polyurethane are available common polymers that can be easily dissolved in the solvents of PAN (formic acid and NMP). So, the PAN composites with these polymers can be readily prepared via solvent cast method. Polyaniline (PAN) was synthesized chemically and coated on the surface of sawdust (SD) from formic acid via cast method. It was found that polyaniline in the acid doped form (e.g. HCl), can be used for Cr(VI) ion removal in acidic aqueous solutions (pH ≤ 2). Adsorption occurs only under acidic conditions and it decreases with increasing the pH of solution significantly. The proposed mechanism for adsorption of Cr(VI) with our currently developed adsorbent seems to be mostly occurring via an anion exchange process. Adsorption of Cr(VI) from water using SD/PAN

column is both a simple and efficient method compared to the other adsorbents reported by previous investigators (*Acta Chim. Slov.* **2006**, 53, 88–94).

A contribution with 119 citations entitled *Sol-gel prepared NiO thin films for electrochromic applications* was published in 2006 by Slovenian authors R. Cerc Korošec and P. Bukovec. The paper summarizes on the topic of changes in optical properties of electrochromic material in the visible part of the spectrum under a certain applied potential. The change is reversible and the material returns to its original state under the opposite electric field. Recently, electrochromism has been applied in electrochromic devices, where in a battery-like assembly the throughput of solar light is controlled by the voltage and is usually termed a smart window. In the first part of this article a brief theoretical introduction to electrochromism and the functioning of smart windows is given. Since in the last decade nickel oxide has been extensively studied as an ion-storage material in electrochromic devices, some properties of nickel oxide are explained in the following part. The electrochromic response (reversibility during potential switching and the degree of coloration) of a nickel oxide thin film, used in an electrochromic device, strongly depends on the degree of heat treatment. Thermal analysis of thin films can give valuable information about a suitable temperature and the duration of heat-treatment when thin films are prepared by chemical methods of deposition. Since thermal analysis of thin films deposited on a substrate is not a common analytical technique, basic strategies are also summarized in the article. After this theoretical introduction, the application of TG analysis to optimisation of the electrochromic response of sol-gel prepared Ni oxide thin films is presented. The electrochromic properties of thin films, thermally treated to different degrees, were tested using spectroelectrochemical methods. Additional techniques (IR, TEM, AFM and EXAFS) were indispensable in following structural and morphological changes during the heat treatment (*Acta Chim. Slov.* **2006**, 53, 136–147).

A contribution with 105 citations entitled *Characterization of Cobalt Oxide Nanoparticles Prepared by the Thermal Decomposition of $[\text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})](\text{NO}_3)_3$ Complex and Study of Their Photocatalytic Activity* was published in 2016 by Iranian authors S. Farhadi, M. Javanmard and G. Nadri. The authors report on thermal decomposition of the $[\text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})](\text{NO}_3)_3$ precursor complex under solid state conditions. Thermal analysis (TG/DTA) showed that the complex was easily decomposed into the Co_3O_4 nanoparticles at low temperature (175 °C) without using any expensive and toxic solvent or a complicated equipment. The obtained product was identified by X-ray diffraction

(XRD), Fourier transform infrared spectroscopy (FT-IR), Raman spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and energy-dispersive X-ray spectroscopy (EDX). Optical and magnetic properties of the products were studied by UV-visible spectroscopy and a vibrating sample magnetometer (VSM), respectively. FT-IR, XRD and EDX analyses confirmed the formation of highly pure spinel-type Co_3O_4 phase with cubic structure. SEM and TEM images showed that the Co_3O_4 nanoparticles have a sphere-like morphology with an average size of 17.5 nm. The optical absorption spectrum of the Co_3O_4 nanoparticles showed two band gaps of 2.20 and 3.45 eV, which in turn confirmed the semiconducting properties. The magnetic measurement showed a weak ferromagnetic order at room temperature. Photocatalytic degradation of methylene blue (MB) demonstrated that the as-prepared Co_3O_4 nanoparticles have good photocatalytic activity under visible-light irradiation (*Acta Chim. Slov.* **2016**, 63, 335–343).

A contribution with 102 citations entitled *Removal of methylene blue from aqueous solutions by wheat bran* was published in 2007 by Algerian authors O. Hamdaoui and M. Chiha. In this work, a fundamental investigation on the removal of methylene blue from aqueous solutions by wheat bran is conducted in batch conditions. Removal kinetic data are determined, and the effects of different experimental parameters, such as wheat bran mass, initial concentration of methylene blue, agitation speed, solution pH, particle size, temperature, and ionic strength on the kinetics of methylene blue removal are investigated. The cationic dye recovery increases with an increase of sorbent mass, solution pH, and temperature. Methylene blue removal decreases with an increase of initial concentration, particle size, and ionic strength. The agitation speed showed a limited influence on the removal kinetics. Modeling of kinetic results shows that sorption process is best described by the pseudo-second order model, with determination coefficients higher than 0.996 under all experimental conditions. The applicability of both internal and external diffusion models shows that liquid-film and particle diffusion are effective sorption mechanisms. The activation energy of sorption calculated using the pseudo-second order rate constants is found to be 13.41 kJ mol⁻¹ from an Arrhenius plot. The low value of the activation energy indicates that sorption is an activated and physical process. Thus, wheat bran, a low cost and easily available biomaterial, can be efficiently used as an excellent sorbent for the removal of dyes from wastewater. It can be safely concluded that wheat bran is much economical, effective, viable, and can be an alternative to more costly adsorbents (*Acta Chim. Slov.* **2007**, 54, 407–418).

However, the number of citations gives only a partial insight into the impact of an article, as older articles may have an advantage over more recent articles due to the longer period of time they can be cited. Another possible insight into scientific importance is provided by the average number of citations per year. Here, we can highlight two contributions with very high average number of citations per year that were not presented above. Contribution with 89 total citations and an average number of citations per year 14.8 entitled *Synthesis and Characterization of Zinc Oxide Nanoparticles with Small Particle Size Distribution* was published in 2018 by Malaysian authors N. M. Shamhari, B. S. Wee, S. F. Chin, K. Y. Kok. The authors report on a solvothermal synthesis having a great potential to synthesize zinc oxide nanoparticles (ZnO NPs) with less than 10 nm size. In this study, a rapid synthesis of ZnO NPs was presented in which ZnO NPs with more uniform shape and highly dispersed were synthesized using zinc acetate dihydrate ($\text{Zn}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$) and potassium hydroxide (KOH) as a precursor and absolute ethanol as solvent via solvothermal method. Few techniques were exploited to characterize synthesized ZnO NPs including X-ray diffraction (XRD), transmission electron microscope (TEM), Brunauer-Emmett-Teller (BET), energy-dispersive X-ray spectroscopy (EDX), fourier transform infrared (FT-IR) spectroscopy, and ultraviolet visible (UV-Vis) spectroscopy. Synthesized ZnO NPs that were prepared via solvothermal synthesis method at 60 °C for 3 hours exhibited a wurtzite structure with a crystalline size of 10.08 nm and particle size of 7.4 ± 1.2 nm. The UV-vis absorption spectrum has shown peak at 357 nm indicate the presence of ZnO NPs. Hence, better quality with uniform size ZnO NPs can be easily synthesized with reduced amount of time via solvothermal synthesis method rather than using other complicated and lengthy synthesis methods (*Acta Chim. Slov.* **2018**, 65, 578–585).

A contribution with 88 total citations and average number of citations per year 8.8 entitled *An Overview of the Optical and Electrochemical Methods for Detection of DNA – Drug Interactions* was published in 2014 by Serbian authors M. M. Aleksić, V. Kapetanović. This review paper gives an overview on a large number of inorganic and or-

ganic compounds that are able to bind to DNA and form complexes. Among them, drugs are very important, especially chemotherapeutics. This paper presents the overview of DNA structural characteristics and types of interactions (covalent and non-covalent) between DNA molecule and drugs. Covalent binding of the drug is irreversible and leads to complete inhibition of DNA function, what conclusively, causes the cell death. On the other hand, non-covalent binding is reversible and based on the principle of molecular recognition. Special attention is given to elucidation of the specific sites in DNA molecule for drug binding. According to their structural characteristics, drugs that react non-covalently with DNA are mainly intercalators, but also minor and major groove binders. When the complex between drug and DNA is formed, both the drug molecule, as well as DNA, experienced some modifications. This paper presents the overview of the methods used for the study of the interactions between DNA and drugs with the aim of detection and explanation of the resulting changes. For this purpose many spectroscopic methods like UV/VIS, fluorescence, infrared and NMR, polarized light spectroscopies like circular and linear dichroism, and fluorescence anisotropy or resonance is used. The development of the electrochemical DNA biosensors has opened a wide perspective using particularly sensitive and selective electrochemical methods for the detection of specific DNA interactions. The presented results summarize literature data obtained by the mentioned methods. The results are used to confirm the DNA damage, to determine drug binding sites and sequence preference, as well as conformational changes due to drug–DNA interaction (*Acta Chim. Slov.* **2014**, 61, 555–573).

The 70th anniversary of *Acta Chimica Slovenica* is thus an excellent opportunity to highlight the achievements and enthusiasm of all editorial team members that served in the past seventy years and those that still serve in this capacity. The anniversary gives also a new impetus for further development, growth and improvement in order to serve the scientific community even better and to address all the challenges we are facing and will be facing in the contemporary fast-changing world of science, research and dissemination of the results.

Franč Perdih
Editor-in-Chief