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Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) Academic interests : Thermal poling, Tellurite glasses, Second-harmonic generation Special talents : Badminton	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) Surface modification of tellurite glass by thermal poling accompanied with ion implantation in a solid-state phase We have developed a new technique for surface modification of glass, with which thermal poling and ion implantation in a solid-state phase are simultaneously accomplished. We have applied this technique to surface modification of tellurite glasses in $\text{Ag}_2\text{O-Na}_2\text{O-ZnO-TeO}_2$ system. The tellurite glass sample, which is a plate about 1 mm thick, is sandwiched in between two commercially available cover glasses, and contacted with stainless steel electrodes. The thermal poling has been carried out at 300°C with a dc voltage of 3.0 kV applied. When both two cover glasses contain Na^+ , the migration of Na^+ from the cover glass to the surface of the tellurite glass takes place at the anode side. This is confirmed by energy dispersive x-ray spectroscopy (EDS). After the thermal poling, we can find that Ag nanocrystals are precipitated in the region near the tellurite glass surface contacted with the anode. We have observed second-harmonic generation (SHG) for the Ag-containing glasses after poling. The value of d_{33} obtained is 0.29 pm / V for the sample poled at 300°C with 3 kV for 60 min.	


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March 2007 Ph.D (Nagaoka University of technology) April 2007- Kyoto University: Postdoctoral fellow (April 2005- Research Fellow of the Japan Society for the Promotion of Science)	Research Interests: Optical materials and science
Abstract of Optional Presentation (Include the Title, Coauthors, Text)	
Fabrication of optical waveguide in glass by laser-induced crystallization and introduction of current research	
Rie Ihara ^{a, b, * †} , Tsuyoshi Honma ^a , Yasuhiko Benino ^{a, 1} , Takumi Fujiwara ^{a, 2} , Takayuki Komatsu ^a , Yomei Tokuda ^b , Masahide T akahashi ^b and Toshinobu Yoko ^b	
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<p>Recently, we discovered that the irradiation of a cw Nd:YAG laser with a wavelength of $\lambda=1064$ nm induces the formation of crystal dots and lines such as $\text{Sm}_x\text{Bi}_{1-x}\text{BO}_3$ and $\beta\text{-BaB}_2\text{O}_4$ in glasses containing Sm_2O_3 or Dy_2O_3. It has been proposed that cw Nd:YAG laser irradiation causes continuous $f-f$ transitions (${}^6\text{F}_{9/2} \leftarrow {}^6\text{H}_{5/2}$) in Sm^{3+} and continuous electron-phonon coupling (i.e., non-radiative relaxation), consequently inducing thermal effects. We succeeded in writing curved crystal lines consisting of nonlinear optical $\text{Sm}_x\text{Bi}_{1-x}\text{BO}_3$ crystals in $\text{Sm}_2\text{O}_3\text{-Bi}_2\text{O}_3\text{-B}_2\text{O}_3$ glasses by using the Nd:YAG laser. Light transmissions ($\lambda=632.8$ nm) were confirmed for the Y-shape divergence crystal lines, indicating that these crystal lines act as optical waveguides.</p> <p>Next we focus on our current research about organic-inorganic materials. In 2002, Niida et al. reported the preparation of low-melting organic-inorganic hybrid glasses through nonaqueous acid-base reactions by direct mixture of the starting materials. The glass network formation reaction of the acid-base reaction method is simply represented by the metathesis $\text{M-OH} + \text{M}'\text{-Cl} \rightarrow \text{M-O-M}' + \text{HCl} \uparrow$ (M and M' are the glass network forming elements). These materials are candidate materials for high figure of merit nonlinear optical application because several kinds of optical centers including organic molecules, rare-earth ions, and metal nanoparticles can be simultaneously doped. Currently, we are trying to apply the new materials to optical device.</p>	
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<p>Brief Biography, including academic interests and special talents My research topic for a Master's degree was spectral hole-burning in rare-earth ion-doped glasses. Now, I am working on a research using metal nanoparticles and interested in hybrid of glasses and metal nanoparticles. I am hardly beaten by arm-wrestling, though I don't have well-developed muscle.</p>	
<p>Abstract of Optional Presentation (Include the Title, Coauthors, Text)</p> <p>Title Longitudinal Self-Assembly of Gold Nanorods and the Optical Properties</p> <p>Authors Go Kawamura, Yong Yang, Masayuki Nogami</p> <p>Introduction The shape of nanoparticles influences their optical and electronic properties. Among the various materials and structures, gold nanorods (GNRs) have attracted special considerations due to their potential uses as strong surface enhanced Raman scattering (SERS) substrate. However, it is generally known that anisotropic colloidal particles, including GNRs, are self-assembled into smectic-like structure by concentrating the dispersions in colloidal solution. The formation of this structure disappointingly results in weakened SERS activity of the GNRs. Therefore, one of recent interests in the research field is controlling assembly of GNRs. In this work, we firstly prepare end-to-end connected GNRs in solution. The connected GNRs show zigzag feature which prevent their self-assembly in smectic fashion. Secondary, a GNR layer is prepared using the end-to-end connected GNRs and examined the SERS activity relative to the surface plasmon resonance properties. Finally, the mechanism of the assembly in end-to-end fashion is discussed.</p> <p>In experiments, GNR solutions were prepared by seed-mediated growth method. End-to-end connection of GNRs was carried out by changing the concentrations of residual chemicals in the solution. GNR layer, prepared by depositing GNR solution on slide glass and drying in air, was examined by SEM observation and optical extinction spectra. The SERS activity of the GNR layer was investigated by Raman spectra of Rhodamine-6G molecules adsorbed on the GNR layer. The driving force of the assembly in end-to-end fashion was considered to be the regioselective electrostatic attraction between the surface stabilizing molecules.</p>	


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Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) Master of Engineering in Applied Chemistry Specialty : All-solid-state lithium rechargeable battery	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) Title : Control and evaluation of electrode-electrolyte interface for the fabrication of high-power all-solid-state lithium batteries	
<p>Lithium-ion rechargeable batteries are widely used for the portable devices. At the present time, organic liquid electrolytes are used in the batteries. However, the liquid electrolytes have the risks of leak and explosion. Our group has studied the solid electrolytes based on sulfide glass materials and has found the sulfide based solid electrolyte with high lithium ion conductivity at room temperature. We have also applied the solid electrolyte to the all-solid-state lithium rechargeable batteries. However, the all-solid-state batteries have the higher resistance than the batteries using liquid electrolyte, and the operation of the all-solid-state batteries under the high current density is difficult. The high resistance is caused by the solid-solid interface between the electrodes and solid electrolytes.</p> <p>My study is the evaluation and improvement of the solid-solid interface between various kinds of electrodes and solid electrolytes based on sulfide glass in the all-solid-state batteries. I apply the popular electrode materials to all-solid-state batteries, and evaluate the performance under the high current densities and the cell resistance by analyzing ac impedance measurements. In addition, the cause of the high resistance is clarified by using microstructure analyzing. After the evaluations, I improve the solid-solid interface. Finally I will be able to prepare the all-solid-state lithium batteries with high power.</p>	


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Brief Biography, including academic interests and special talents Sol-gel science, porous materials, light scattering.	
Abstract of Optional Presentation HIERARCHICALLY POROUS TITANIA PREPARED FROM ALKOXIDE-DERIVED SOL-GEL SYSTEMS J. Konishi, K. Fujita, K. Nakanishi, and K. Hirao <p>Phosphorylation plays a key role in cellular signaling network. In particular, it is known that phosphorylation and dephosphorylation of proteins regulates a variety of biological processes. Mass spectroscopic method is one of the powerful tools for identifying and characterizing phosphoproteins; however, it often suffers from the low concentration of objective substance. Selective enrichment of phosphopeptides from non-phosphopeptides is required before identification to enhance the efficiency. Porous TiO₂ has attracted considerable attention as the separation medium for phosphorylated compounds because of its adsorption selectivity toward the phosphate groups.</p> <p>In my research, multi-scale porous nanocrystalline TiO₂ monoliths are prepared through a sol-gel process accompanied by the phase separation. A large-dimension monolith with well-defined macropores and mesostructured anatase-type TiO₂ gel skeleton is spontaneously obtained by controlling the solution pH during the hydrolysis and polycondensation reactions of titanium alkoxides. The size of macropores is adjusted by the starting composition. The separation of simple sample mixture containing phosphorylated compounds proves that the resultant TiO₂ monoliths have a potential as separation media for phosphorylated compounds.</p>	


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Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) I'm interested in the optical and magneto-optical properties of glasses. My hobby is playing basketball and watching sports.	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) Magneto-optical and Magnetic properties of amorphous Eu-Ti-O thin films Kazuma Kugimiya, Koji Fujita, Katsuhisa Tanaka, and Kazuyuki Hirao When a magnetic field is applied parallel to the direction of light wave, the linearly polarized light emerges as elliptically polarized light with the major axis of the ellipse rotated, which called Faraday Effect. Faraday rotation angle is proportional of the product of the light path length and the external magnetic field or the magnetization (in the case of ferromagnet). As for paramagnet, the constant of proportion terms Verdet constant. The material with a large value in Verdet constant is utilized as an optical isolator in optical system to prevent backward reflection of light. It is well known that chalcogenite and glasses containing divalent Eu ions exhibit a large magneto-optical effect in visible range. We have prepared amorphous Eu-Ti-O thin films by the pulsed laser deposition technique and examined their magnetic and magneto-optical properties. X-ray diffraction analysis indicates that the resultant thin film is amorphous. Faraday effect attributable to the $4f^7 \rightarrow 4f^6 5d^1$ transition of Eu^{2+} is observed in the wavelength range from 350 to 850 nm. The Faraday rotation angle of the amorphous Eu-Ti-O thin film is rather large; for instance, the magnitude of Verdet constant is $0.17 \text{ deg} \cdot \text{cm}^{-1} \cdot \text{Oe}^{-1}$ at the wavelength of 470 nm at room temperature. This value is larger by two orders of magnitude than those of Eu^{2+} -containing oxide glasses.	


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Home Page: http://www1.kuic.kyoto-u.ac.jp/	<p>Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>)</p>
<p>Abstract of Optional Presentation (Include the Title, Coauthors, Text)</p> <p>Photo-Initiated Growth of Zinc Oxide (ZnO) Nanowires in Aqueous Solutions E.T.Y. Lee, Y. Shimotsuma, K. Miura and K. Hirao</p> <p>Zinc oxide (ZnO) nanostructures are of interest due to a wide band gap (3.37 eV) and a large exciton binding energy (60 meV) at room temperature and ultraviolet (UV) light emission. A number of physical and chemical solution synthesis processes have been studied for the growth of ZnO nanostructures but these require rigorous conditions of high temperature, low pressure, complex procedures, extended growth period or the use of catalysts that could be embedded on the nanostructure tip. In the current work, a catalyst-free synthesis process without the above-mentioned adverse conditions, combining the simplicity of femtosecond laser irradiation to initiate nucleation sites in aqueous solutions at room temperature and pressure, followed by hydrothermal treatment at low temperatures for crystal growth, is investigated. Different pH level solutions based on ammonium hydroxide were studied with large flat-top nanorods grown at pH 8 and nanowires with tips grown at pH 11. The difference in morphology is due to the different growth rates of the crystal facets. Modulation of the laser processing parameters also affected the morphology of nanostructures grown. Photoluminescence analysis showed emission at about 380 nm in the UV range.</p> <p>(Please note that however I won't be making any presentation based on my research work)</p>	


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Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) Academic interests: laser optics, metal nanostructures, and surface plasmon resonance.	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) <p style="text-align: center;">Optical properties of d^0 transition metal ions-doped glass materials and functional polymer composites for random lasers</p> <p style="text-align: center;">Xiangeng Meng, Katsuhisa Tanaka, Koji Fujita and Shunsuke Murai</p> <p>My research includes two topics, which consist of multifunctional glass materials doped with d^0 transition metal ions and functional polymer composites for random lasers. The first research involves that a sort of novel glass materials has been developed for applications in displays and optical storages. The as-prepared glasses exhibit visible photoluminescence with photoluminescence colors tunable from blue to orange yellow when the glasses are exposed to either ultraviolet light or near-infrared femtosecond pulsed laser, in which the photoluminescence under near-infrared femtosecond pulsed laser excitation corresponds to a multi-photon process. The results demonstrate that the photoluminescence profile under ultraviolet excitation can be well traced by near-infrared femtosecond pulsed laser excitation. The second research presents a facile method to achieve random lasers with coherent feedback by utilizing polymer films embedded with silver nanoparticles as laser medium. The obtained random lasers exhibit unique characteristics differing from not only those observed in strong scattering semiconductor systems but also those in weak scattering systems. We expect that the work will lead to extensive research in fields of random lasers mediated by metal nanostructures.</p>	

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Brief Biography, including academic interests and special talents <i>Hobbies : tennis, traveling abroad, skiing, snowboarding, and scuba diving</i> <i>Academic interests : all-solid-state lithium secondary battery, solid electrolyte</i>	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) <p style="text-align: center;"><i>Synthesis and characterization of high lithium ion conducting sulfide glasses and glass-ceramics</i></p> <p style="text-align: center;"><i>Keiichi Minami, Akitoshi Hayashi, and Masahiro Tatsumisago</i></p> <p><i>High lithium ion conducting solid electrolytes have attracted much attention for applications to all-solid-state lithium secondary batteries. Sulfide based glassy solid electrolytes in the $\text{Li}_2\text{S}-\text{P}_2\text{S}_5$ system showed high conductivity over $10^{-4} \text{ S cm}^{-1}$ at room temperature. We have succeeded in preparing high lithium ion conducting glass-ceramics at the composition of $70\text{Li}_2\text{S} \cdot 30\text{P}_2\text{S}_5$ (mol%) prepared by the mechanical milling method and the melt quenching method. The glass-ceramic obtained by crystallization of the glass exhibited much higher conductivity than the original glass and the conductivity showed $3.2 \times 10^{-3} \text{ S cm}^{-1}$ at room temperature. It is the highest conductivity in all of lithium ion conducting solid electrolytes. A new lithium ion conducting crystalline phase ($\text{Li}_7\text{P}_3\text{S}_{11}$ crystal), which has not been reported so far, was precipitated from the glass. The enhancement of conductivity of the glass-ceramic was due to the precipitation of superionic $\text{Li}_7\text{P}_3\text{S}_{11}$ crystal in the glass-ceramic.</i></p>	

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<p>Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) Nagaoka University of Technology, First grade postgraduate. I interest in ionics of glass and glass ceramics for Li ion conduction.</p>	
<p>Abstract of Optional Presentation (Include the Title, Coauthors, Text)</p> <p>Lithium ion conductive glass-ceramics and YAG laser-induced local crystallization in lithium ion phosphate glasses.</p> <p style="text-align: right;">Nagaoka University of Technology Material Science and Technology, Functional Glass Laboratory Kenta Nagamine, Tsuyoshi Honma, Takayuki Komatsu</p> <p>Lithium ion secondary batteries have been widely used as energy sources of laptop-type personal computers, mobile phones, and so on. Lithium iron phosphates such as olivine-type LiFePO_4 and NASICON-type $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$ have been proposed to be potential candidates for use as materials for the next generation of rechargeable lithium ion batteries. Lithium iron phosphate was synthesized by various methods such as solid-state synthesis, hydrothermal synthesis. However, synthesis by crystallization of glass has not been reported. Crystallization of glass has some advantages over other method. On the other hand, recently, authors' group Hirose et al. reported that the fabrication of olivine type LiFePO_4 crystals is succeeded by heat-treatments in an electric furnace and Nd:YAG laser irradiation for $\text{Li}_2\text{O}-\text{FeO}-\text{Nb}_2\text{O}_5-\text{P}_2\text{O}_5$ glasses. We focused on $\text{Li}_2\text{O}-\text{Fe}_2\text{O}_3-\text{Nb}_2\text{O}_5-\text{P}_2\text{O}_5$ glasses, aimed to fabrication of NASICON-type crystal $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$. The glasses with the composition of $37.5\text{Li}_2\text{O}-(25-x)\text{Fe}_2\text{O}_3-x\text{Nb}_2\text{O}_5-37.5\text{P}_2\text{O}_5$ (mol%) ($x=5,10,15$) were prepared, and it is found that the addition of Nb_2O_5 was effective for the glass formation in the lithium iron phosphate system. $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$ crystals were obtained by heat-treatment of the glass in an electric furnace. This glass ceramics show the electrical conductivities of $2 \times 10^{-6} \text{Scm}^{-1}$. Continuous wave Nd:YAG laser is irradiated on the surface of the glasses. The formation of $\text{Li}_3\text{Fe}_2(\text{PO}_4)_3$ crystals was confirmed by XRD and Raman scattering.</p>	

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Brief Biography, including academic interests and special talents (<i>musical instruments, vocals, dance, etc.</i>) glass, glass ceramics, thin film	
Abstract of Optional Presentation (Include the Title, Coauthors, Text) <p style="text-align: center;">Fabrication of BaO-TiO₂-GeO₂ crystallized glass thin film</p> <p style="text-align: center;">R. Ogawa¹, H. Masai¹, Y. Takahashi¹, H. Mori¹, T. Fujiwara¹, T. Komatsu² ¹Tohoku Univ., ²Nagaoka Univ. Tech.</p> <p>Fresnoite (Ba₂TiSi₂O₈) and its related crystals have been absorbed much attention because they possess the excellent ferroelastic, pyroelectric, and piezoelectric properties. Especially, Ba₂TiGe₂O₈ (BTG) has been applied surface acoustic wave devices. The BTG crystallize in a fresnoite structure which is constructed the corner-linked pyramidal TiO₅ and pyrogermanate Ge₂O₇ groups.</p> <p>We have reported transparent BTG surface-crystallized glass exhibiting a large second-order nonlinear optical constant, comparable to that of LiNbO₃. It is considered that the BTG-crystallized glass has a great potential for photonic device components. Recently, as a first step in constructing a photonic device, we have succeeded the fabrication of a glass thin film which crystallizes the BTG phase. However, crystallization behavior in the BTG glass thin film is unclear. Therefore, the purpose of my work is to examine their crystallization mechanism.</p>	

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Abstract of Optional Presentation (Include the Title, Coauthors, Text) <p style="text-align: center;"><i>SYNTHESIS AND CHARACTERIZATION OF LOW BANDGAP NANOCRYSTALLINE t-ZIRCONIA</i></p> <p style="text-align: center;">Niki Prastomo ¹, Zainovia Lockman ², Ahmad Fauzi Mohd Noor ², Ahmad Nuruddin ³ and Atsunori Matsuda ¹</p> <p style="text-align: center;">¹ Department of Materials Science, Toyohashi University of Technology 1-1 Hibarigaoka, Tempaku-cho, Toyohashi, Aichi 441-8580, Japan ² School of Materials & Mineral Resources Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Seberang Perai Selatan, Pulau Pinang, Malaysia ³ Department of Engineering Physics, Faculty of Industrial Technology Institut Teknologi Bandung Jalan Ganesha 10 Bandung 40132, Indonesia</p> <p style="text-align: center;">ABSTRACT</p> <p>Nanocrystal t-ZrO₂ powders were synthesized through a chemical route to seek a possibility if electronic doping would improve the electronics conductivity of the oxide. Y³⁺ was added as a stabilizer to retain tetragonal phase ZrO₂ whereas Nb⁵⁺ was added for electronics doping. The phase formation and stabilization to achieve 100% pure t-ZrO₂ were studied in detail encompassing all possible parameters which would contribute to the phase formation. Polymer decomposition and soft combustion methods were performed in this study to produce the doped zirconia. Precursor solutions were prepared from a mixture of zirconyl nitrate (ZrO(NO₃)₂), yttrium nitrate (Y(NO₃)₃), niobium tartarate (HNb(C₄O₆)) and TEA (triethanolamine) for polymer decomposition method, while zirconyl nitrate, yttrium nitrate, niobium nitrate (Nb(NO₃)₅) and glycine were used in soft combustion method. Several dopants compositions of zirconia powders were prepared by thermal decomposition method and were annealed at different temperatures. The synthesized powders were characterized using Differential Thermal Analysis (DTA), X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM). The average particle size of the powders calcined at 700°C in this study ranges from 13.00 to 38.00 nm. The addition of Nb⁵⁺ did not alter the stability of the tetragonal phase formed in powder synthesis. Upon sintering different kind of atmosphere (argon-carbon, vacuum and air) it was found that at high sintering temperature, 1250°C to 1600°C, t-ZrO₂ had transformed to m-ZrO₂. However 100% t-ZrO₂ was retained with sintering at 1400°C in vacuum condition. The optical band gap as measured by the UV-Visible Spectrometer for the sintered sample with t-ZrO₂ gave a minimum value 4.00 eV, lower than the optical bandgap from commercial Ytria Stabilized Zirconia (YSZ) which was 6.09 eV.</p>	

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Brief Biography, including academic interests and special talents

I'm a member of Inorganic Optoelectronic Materials Engineering Lab. I'm interested in chalcogenide glasses such as sulfide glasses. Now I study a new series of photonics sulfide glass. My hobby is playing soccer and enjoying surfing.


〈Formation and properties of chalcogenide glasses in the Cu-Sb-S system〉

Chalcogenide glasses (ChG) consist of the anionic elements S, Se and Te which replace O in conventional oxide glasses. These ChG are characterized by a wide variety photo-induced phenomenon, longer wavelength IR transmission and high refractive indexes. A new series of ChG in $\text{Cu}_2\text{S-Sb}_2\text{S}_3$ system was prepared by the conventional melt-quenching method and decided the glass forming region using x-ray diffraction analysis, scanning electron microscope and differential thermal analysis. Physical properties such as glass transition temperature (T_g), crystallization temperature (T_x), density (ρ), optical transmission and electrical resistivity were measured.

The glass forming regions are located between 21.5 and 24.5 mol% Cu_2S in $x\text{Cu}_2\text{S-(100-x)}\text{Sb}_2\text{S}_3$. Table 1 shows physical properties, normalized molar volume V_m and the average coordination number Z_{av} in $x\text{Cu}_2\text{S-(100-x)}\text{Sb}_2\text{S}_3$. The result shows Cu-Sb-S glasses have low T_g ($= 185^\circ\text{C}$) and small ΔT ($= T_x - T_g = 57$). It also shows a composition dependence of normalized molar volume as V_m decreases with the increase of Cu_2S concentration. The glass (thickness: 0.4 mm) has the transmission in the near IR and IR region between 0.8 and 16 μm . The result of the electric resistivity indicates the value of glass phase has higher than that of crystallized glass phase and the change is about 3 orders between glass and crystallized glass phase.

Table 1 Thermal and physical properties of glasses in $x\text{Cu}_2\text{S-(100-x)}\text{Sb}_2\text{S}_3$ system.

Composition x (mol%) ± 0.5	Characteristic temperature ($^\circ\text{C}$)			Density (g/cm ³) $\rho \pm 0.01$	V_m	Z_{av}
	$T_g \pm 3$	$T_x \pm 5$	ΔT			
21.5	184	241	57	4.49	0.83	2.81
22.5	185	242	57	4.53	0.82	2.84
23.5	185	243	58	4.54	0.81	2.86
24.5	185	245	60	4.55	0.80	2.88

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Academic interests: Synthesis of porous functional materials. Special talents & hobby: Kyudo(Japanese art of archery), Snowboarding	
Abstract of Optional Presentation (Include the Title, Coauthors, Text)	
Synthesis of Monolithic Al₂O₃ with Well-Defined Macropores and Mesostructured Skeletons via the Sol-Gel Process Accompanied by Phase Separation	
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<p>Polycrystalline alumina (Al₂O₃) and aluminate ceramics have a broad range of application owing mainly to their high mechanical stability. Porous alumina/aluminates as well as the silicate families have been widely used as catalyst supports. It has been reported that monolithic silica, siloxane-based hybrid and titania materials with well-controlled hierarchical pore systems can be synthesized via sol-gel route accompanied by phase separation. Sol-gel alumina/aluminates, however, have rarely been prepared in monolithic form, because of the difficulty in controlling the reactivity of the precursors.</p> <p>In our experiments, pure alumina monoliths with well-defined macropores and mesostructured skeleton have been synthesized via a spontaneous route from the aqueous and ethanolic solution of aluminum salts in the presence of propylene oxide and poly(ethylene oxide)(PEO). The addition of propylene oxide to the starting solution controls the gelation, while the addition of PEO induces the phase separation. Appropriate choice of the starting composition, by which the phase separation and gelation concur, produces large dimension (10mm×10mm×10mm), bicontinuous macroporous Al₂O₃ monoliths. The size of macropores is controlled in the range of 400 nm to 1.8 μm, depending on the starting composition. The dried gel is amorphous, while the heating at temperatures above 800 °C for 5 h leads to the formation of crystalline phases without spoiling the macroporous morphology.</p>	

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Abstract of Optional Presentation (Include the Title, Coauthors, Text) <p style="text-align: center;">Growth and spectral properties of Tm³⁺ doped YAP and LSO laser crystals in 2 μm region</p> <p style="text-align: center;">Yanhua Zong, Guangjun Zhao</p> <p>Tm³⁺ doped solid-state lasers in 2 μm region, which can be directly pumped by commercially available laser diodes and possess high conversion efficiency due to the cross relaxation mechanism, have received much attention in recent years. In our experiment, Tm³⁺ doped YAlO₃ (YAP) crystals with various doping concentrations (1at%, 3at%, 4at%, 5at% and 15at%) as well as Tm³⁺ doped Lu₂SiO₅ (LSO) crystal with 4at% doping concentration were successfully grown by Czochralski (Cz) method. All of them are free from cracking and inclusions and have high optical quality. Crystal structure of the as-grown crystals was examined by XRD and Segregation coefficients of Tm³⁺ in the crystals were measured by ICP. Thermal conductivity measurements show that the thermal conductivity of Tm:YAP decreases apparently with the increase of Tm³⁺ concentration, while that of Tm:LSO is almost coincident with undoped LSO crystal. Spectra and laser properties of the crystals were also carefully studied. For Tm:YAP crystals the best laser performance was achieved with the c-cut 4at% samples at 1.935μm with a maximum output 8.1W and a highest slope efficiency 42%, while for the 4at%Tm:LSO an output of 0.6W at 1.99μm was achieved at 77K.</p>	