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14 June Saturday					
Keynote Session 4					
09:00 09:35		Characterization of heat transport at interfaces in multilayers, nanocomposites and nanofluids *Nicolas Horny*			
09:35 10:10		Heat transfer properties of complex porous media *Dominique Baillis*			
10:10 10:55		Laser-based linear and nonlinear elastic bulk (3D), surface (2D), and wedge (1D) waves in materials science *Peter Hess*			
10:55 11:15		COFFEE BREAK with Poster Session B (P46-P94)			
PARALLEL SESSIONS 5					
SALOON A			SALOON B		
11:15 11:30	30	Thermophysical properties of ionic liquids with [NTf2]– anions *J. Safarov, A. Shahverdiyev and E. Hassel*	5	Simulation of convection heat transport in open-cell metal foam *A. S. Suleiman and N. Dukhan*	
11:30 11:45	117	The density-salinity relation of standard seawater *H. Schmidt, H. Wolf and E. Hassel*	6	Characterization of oscillating water transport in metal foam *Ö. Bağcı, N. Dukhan and M. Özdemir*	
11:45 12:00	89	Thermophysical characterization of a urea based eutectic mixture for thermal energy storage *S. G. Cavia, G. Diarce, A. Campos-Celador, A. G. Romero and J. M. Sala*	126	Modeling of the bubble growth dynamics in PS/CO2 foaming system *M. Salehi, M. Rezaei and M. Salami Hoseini*	
12:00 12:15	94	The IAPWS industrial formulation for the thermodynamic properties of seawater *S. Herrmann, H. J. Kretzschmar, R. Feistel and W. Wagner*	128	Enhancement of compression performances of foam core sandwich composites *B. M. Icten, Tuba A. and H. E. Yalkin*	
12:15 12:30	72	Molecular simulation of nano-dispersed fluid phases *M. T. Horsch, S. V. Lishchuk, S. J. Werth and H. Hasse*	132	Mechanical properties, microstructure and density of rigid crosslinked PVC/organoclay nanocomposite foams *R. Izadpanah, A. Karimpour and M. Rezaei*	
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thickness of the shell was considered as the concentration boundary thickness. Since the concentration gradient at the interface of the bubble and shell is needed to calculate the bubble pressure. So using of finite difference method and the gas concentration gradient at the interface has led the results more consistent with the experiments.

Keywords: Polymeric foam; Bubble growth dynamics; Viscoelastic fluid; Mass diffusion; Polystyrene; Carbon dioxide

The IAPWS Industrial Formulation for the Thermodynamic Properties of Seawater

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The development and operation of desalination plants or cooling of power plants using seawater require the knowledge of accurate thermodynamic properties of seawater and their fast calculation.
In 2013, the International Association for the Properties of Water and Steam (IAPWS) adopted the "Advisory Note No. 5: Industrial Calculation of the Thermodynamic Properties of Seawater" (IAPWS 2013) [1] as an international standard for the calculation of the thermodynamic properties of seawater for industrial use. This standard contains an equation of state for the Gibbs free energy for seawater consisting of Gibbs free energy equations for pure liquid water and for saline. The water part is computed from the "IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam" (IAPWS-IF97) and the saline part from the "IAPWS Formulation 2008 for the Thermodynamic Properties of Seawater" (IAPWS-08) [2]. For seawater in contact with ice, the "Revised IAPWS Release on an Equation of State 2006 for H_2O Ice Ih" is used.
The industrial formulation is valid for seawater with sea salt of the reference composition at temperatures T from 261 K to 353 K, pressures p from 0.3 kPa to 100 MPa, and salinities S from 0 (pure water) to 120 g kg^{-1}, with some restrictions in certain regions as described in and.
All thermodynamic properties such as density ρ, specific volume v, specific enthalpy h, specific isobaric heat capacity c_p, and specific entropy s, thermodynamic derivatives, and inverse functions from given quantities (p,h,S) and (p,s,S) can be computed. In addition, boiling temperature T_b, freezing temperature T_f, osmotic pressure p_{osm}, and properties for brine-vapor mixtures and brine-ice mixtures are calculable.
When using the industrial formulation IAPWS 2013, the uncertainties of the calculated seawater properties are slightly greater than those of the scientific formulation IAPWS-08. The differences between both formulations result from the use of IAPWS-IF97 for the pure-water part in the industrial formulation and the use of IAPWS-95 in the scientific formulation. They will be discussed in this paper.
The computing speed of the industrial formulation IAPWS 2013 for seawater is increased in the order of 100 to 200 depending on the property function in comparison with the use of the scientific formulation IAPWS-08. Details will be shown in this paper.
The industrial formulation IAPWS 2013 for seawater can be applied in calculations for analyzing, designing, simulating, operating, and optimizing desalination and cooling processes.

Keywords: Seawater, Thermodynamic properties, Industrial standard