10-year track record of George Kaptay

The total 63 papers published by myself and with coauthors in journals with impact factors in the period of 2003-2012 appeared in 29 journals. Although the majority of those journals are on metallurgy and materials (according to my education), but journals on nanoscience, colloid science, surface science, electrochemistry and even pharmaceutics are also in the list. The total number of known independent citations received for the above 63 papers is 520. The h-index calculated from these data is 12 (only papers published between 2003 and 2008 contribute to this h-index). The cumulative impact factor for these papers is about 98 (the 2012-papers are taken by the 2011-IFs). If all impact factors are divided by the number of authors of the given paper, my partial cumulative impact factor is about 63.

In a chronological order the ten most important subjects of the last 10 years are listed as follows, with detailed bibliography of the corresponding "leading" papers. Their major message (if not obvious from the title) and their further development is shortly explained without detailed bibliography of the later papers.

Subject 1: Particles stabilized foams and emulsions. (J.84[1]). G.Kaptay: Interfacial criteria for stabilization of liquid foams by solid particles. Colloids Surfaces A, 230 (2004) 67-80 (IF = 1.513, IC = 112[2]). Although it is well cited, it is not fully understood even by some review papers (see J143, 2012, IF = 8.120, IC = 0). Later this model was extended to emulsions stabilized by particles (J102, 2006, IF = 1.611, IC = 56). Based on this a new class of materials is developed: particles stabilized metallic emulsions (J121, 2009, IF = 1.564, IC = 4). Later, this type of emulsions were successfully inverted (J136, 2011, IF = 2.236, IC = 0) and their stabilization was also realized by thin films precipitated in-situ from multi-component liquid alloys (J149, 2012, IF = 1.649, IC = 0). A method is developed to measure contact angle of a liquid alloy on small particles under another liquid alloy (J127, 2010, IF = 1.859, IC = 2).

Subject 2: Modeling excess Gibbs energy of solutions. (J.87). G.Kaptay: A new equation for the temperature dependence of the excess Gibbs energy of solution phases. Calphad 28 (2004) 115-124. (IF = 2.119, IC = 36). Using this new exponential equation, the artificial inverted miscibility gaps of the Calphad (= calculation of phase diagrams) method can be avoided (such artifacts often appear when a classical linear equation is used). Improving this idea further, the 4th law of chemical thermodynamics is declared, claiming that all real solutions tend towards ideal solutions with increasing temperature (with pressure and composition kept constant), under the condition that the reference states of all components and the solution are selected identical (J140, 2012, IF = 1.545, IC = 0).

[1] This numbering is my original numbering, for a detailed list see www.kaptay.hu (J = journal paper).
[2] IF = impact factor according to ISI, IC = independent citations (no overlap between citing and cited authors).

Subject 3: Modeling, synthesis and recycling of composites. (J.90). T.Bárczy, G.Kaptay: Modeling the infiltration of liquid metals into porous ceramics. Mater Sci Forum, 473 (2005) 297-302. (IF = 0.399, IC = 24). A new equation for the threshold pressure is derived, later proven experimentally (J117, 2008, IF = 1.806, IC = 12) and extended to fibrous performs (J109, 2008, IF = 2.533, IC = 12). The principle of in-situ laser assisted synthesis of steel/TiC surface composites is developed (J122, 2009, IF = 1.793, IC = 5) and the new material is applied as cutting tool (J135, 2011, IF = 1.783, IC = 2). To develop carbon fibers reinforced aluminum matrix composites (J156, 2012, IF = 2.695, IC = 0) perfect wettability of carbon by liquid aluminum under a special flux was achieved (J129, 2010, IF = 1.859, IC = 3). Recycling of Al/SiC composites was developed in (J137, 2011, IF = 1.545, IC = 1).

Subject 4: Modeling thermo-physical properties of liquid metals and alloys. (J94) G.Kaptay: Modeling interfacial energies in metallic systems. Mater Sci Forum, 473 (2005) 1-10. (IF = 0.399, IC = 16). It is extended to cohesive energy, volume expansion coefficient (J115, 2008, IF = 1.806, IC = 11), dynamic viscosity (J.95, 2005, IF = 0.842, IC = 18), self-diffusion coefficient (J110, 2008, IF = 0.819, IC = 4) and critical temperature (J155, 2012, IF = 0.953, IC = 0) of liquid metals and also to the viscosity of liquid alloys (J104, 2007, IF = 0, IC = 9).

Subject 5: Modeling interfacial forces. (J.96). G.Kaptay: Classification and general derivation of interfacial forces, acting on phases, situated in the bulk, or at the interface of other phases. J Mater Sci 40 (2005) 2125-2131 (IF = 0.901, IC = 16). The extended version is also out (J144, 2012, IF = 0.56, IC = 0).

Subject 6: Modeling surface phase transition. (J.99). G.Kaptay: A method to calculate equilibrium surface phase transition (SPT) lines in monotectic systems. Calphad 29 (2005) 56-67 (IF = 1.344, IC = 4). The Butler equation is extended to calculate SPT lines originally predicted by Cahn. It is extended to other systems (J116, 2008, IF = 1.806, IC = 5) and to model welding of steels (J154, 2012, IF = 1.545, IC = 0).

Subject 7. Electrochemical synthesis of compounds and carbon nanotubes. T.Gábor, F.H.Kármán, J.Sytchev, E.Kálmán, G.Kaptay: The separation of carbon nanotubes from chlorides. Carbon 47 (2009) 1195-1198 (IF = 4.504, IC = 3). This paper on the electrochemical synthesis of carbon nanotubes from molten salts is developed further in (J125, 2009, IF = 3.325, IC = 7). A new method was developed to convert usual phase diagrams into electrochemical synthesis diagrams (J142, 2012, IF = 3.832, IC = 0).

Subject 8. Extension of the Calphad method to nano-systems. (J132). G.Kaptay: The Extension of the Phase Rule to Nano-Systems and on the Quaternary Point in One-Component Nano Phase Diagrams. J Nanosci Nanotechnol 10 (2010) 8164–8170. (IF = 1.352, IC = 0). Later I found a conceptual mistake in the derivation of the Kelvin equation (1871). I introduced corrected

equations for the vapor pressure above nano-droplets, melting point of nano-crystals (J146, 2012, IF = 1.563, IC= 0) and solubility of nano-crystals (J147, 2012, IF = 3.350, IC = 0). A review paper is published recently (J153, 2012, IF = 2.015, IC = 0).

Subject 9. The reform of the SI system (International System of Units). (J.138). G.Kaptay: On the five base quantities of nature and SI (The International system of Units) – JMM B 47 (2011) 241-246. (IF = 1.317, IC = 1). I show that 5 base quantities and 5 base units are sufficient to describe all natural phenomena, despite the recommendation of the SI to use 7 base quantities and 7 base units. Candela is not a base unit, rather a derived unit. Mole follows from an arbitrarily selected definition of the Avogadro number (= number of atoms in 12 g (it is an arbitrary amount) of the C-12 isotope), although atoms can be counted sufficiently by positive integer numbers, which follows from basic mathematics (i.e. mole should be treated as an additional unit). This paper was rejected from Metrologia (the official journal of SI) not because what I claim is mistaken, but because what I claim is "obvious to everyone" (I do not think so – see the current website of SI). As a consequence, we teach 7 (instead of the sufficient 5) base units to 100 million children each year around the world, probably loosing more of them for science than would be inevitable. The only citation I got so far is from a US-based teacher (SI would be easier to introduce into US with 5 base units).

Subject 10. Modeling interfacial energies between condensed phases. (J157). G.Kaptay: On the interfacial energy of coherent interfaces. Acta Mater, doi: 10.1016/j.actamat.2012.09.002 (IF = 3.755, IC = 0). It is extended to model interfacial energies at liquid/liquid interfaces (J112, 2008, IF = 1.530, IC = 5).

One monograph and two selected book chapters published after 2003:

i. G. Kaptay: Materials equilibria in macro-, micro- and nano-systems (in Hungarian). Raszter, Miskolc, Hungary, 2011, 359 pp.

ii. G.Kaptay, G.Vermes: Interfacial forces: classification, Encyclopedia of Surface and Colloid Science, Taylor & Francis, 2009, pp.1-19

iii. iii. G.Kaptay, N.Babcsán: Particle Stabilized Foams. Chapter 7 in book: „Foam Engineering: Fundamentals and Applications" ed. by P.Stevenson, John Wiley & Sons, West Sussex, GB, 2012, pp.121-143.

Ten selected invited presentations at conferences after 2003:

i. G.Kaptay: Thermodynamic of materials at high temperatures – International FRAY Symposium on Metals and Materials Processing in a Clean Environment, 28 November 2011, Cancun, Mexico.

ii. G.Kaptay: Interfacial forces, energies and phenomena. A 4-hour short course at Euromat-2011, Montpellier, France, 11 September, 2011.

iii. G.Kaptay: Base physical quantities and laws of nature: what is our knowledge based on? – invited at 43th International October Conference on Mining and Metallurgy, 12-15 October, 2011, Kladovo, Serbia.

iv. G.Kaptay: Equilibrium of nanomaterials – NanoSmat 5 conference, Reims, France, 21 October, 2010.

v. G.Kaptay: To the 300th anniversary of the paper on „Spontaneous Ascent of Water" by Francis Hauksbee – 6th HTC, Athens, Greece, 6-9 May, 2009.

vi. G.Kaptay: High temperature interfacial forces, energies and phenomena – Short Course at Euromat Glasgow, UK, 6 September, 2009.

vii. G.Kaptay: Stabilization of liquid metallic foams and emulsions by solid particles – Euromat 2005, 7 September, 2005, Prague, D21 Keynote lecture

viii. G.Kaptay: High temperature interfacial forces, energies and phenomena. Short Course at Euromat 2005, 4 September, 2005, Prague (a 6-hours one-man-show)

ix. G.Kaptay: On interfacial energies, forces and phenomena in systems, including a molten salt phase – Molten Salts Discussion Group, Cambridge, UK, 21-22 July, 2004.

x. G.Kaptay: Modelling interfacial energies in systems, containing molten salts (first plenary lecture) – EUCHEM 2004 Molten Salts Conference, Piechowice, Poland 20-25 June 2004.

Three selected organizations of conferences:

i. EUROMAT-2005 conference, co-chairman, Prague, Czech Republic, 5-8 September, 2005.

ii. 5th Solidification and Gravity Conference, co-chairman: Lillafüred, Hungary.1-4 September 2008,

iii. High Temperature Capillarity (HTC) conference series (2012, 2009, 2007), member of Scientific Board.

I was a supervisor (or co-supervisor) of 46 students research works, 19 diploma works and 9 PhD thesis. The names of recent PhD students supervised (or co-supervised) by me (with the year of their PhD degree obtained): J.Sychev (2006), O.Verezub (2007), T.Gábor (2008), I.Budai (2009), P. Baumli (2010). They are all great young men/women and are promising young scientists.