

A. Cuneyt Tas / ACCOMPLISHMENTS

March 2, 2026

<https://www.cuneyttas.com>

<https://scholar.google.com/citations?user=VegI5ywAAAAJ&hl=en>

<https://www.linkedin.com/a-cuneyt-tas-8a971118>

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May '93	Ph.D. in Materials Sci. and Eng., Major: ceramic engineering (Iowa State University , Iowa, USA)
Jun '93 - Nov '97	Assistant Professor (METU , Ankara, Turkey)
Nov '97 - Jan '02	Associate Professor (METU)
Feb '99 - Feb '01	Visiting Professor (<i>Max-Planck-Institut fuer Metallforschung, Stuttgart, Germany</i>) – now defunct
Sep '01 - May '03	Senior Staff Scientist (<i>Merck Biomaterials GmbH, Darmstadt, Germany</i>) – now defunct
May '03 - Apr '06	Research Associate Professor (Clemson University , South Carolina, USA)
May '06 - Nov '06	Professor (Mersin University , Mersin, Turkey)
Nov '06 - Sep '10	Professor (Yeditepe University , Istanbul, Turkey)
Aug '07 - Jul '08	Visiting Prof. (New York University , New York, USA)
Sep '10 - Oct '11	Visiting Prof. (University of Oklahoma , Oklahoma, USA)
Apr '12 - Jun '15	Research Scholar (University of Illinois at Urbana-Champaign , Illinois, USA)
Jul '15 - Dec '22	Senior Principal Scientist (<i>Solidia Technologies, New Jersey, USA</i>) – now defunct
Jan '23 - Dec '23	Principal Scientist (Queens Carbon , New Jersey, USA)
Start date: Mar '24	Principal Materials Scientist (<i>Carbon Limit, Florida, USA</i>)

Metrics

Peer-reviewed Journal publications:	71		
Google Scholar metrics:	>7300 citations	h-index: 43	i ₁₀ -index: 79
Symposium/Conference talks :	129		
Book chapters :	34		
ICDD X-ray diffraction patterns :	18		
Phase diagrams :	2	Graduate (<i>M.Sc. & Ph.D.</i>) theses supervised:	10
Patents (<i>issued</i>):	31	Undergraduate theses supervised:	28
Link to Ph.D. thesis			
Link to M.Sc. thesis			

Underlined texts in blue have hyperlinks.

Awards / Honors

- Nominated then elected, *Member/* [International Centre for Diffraction Data](#) (since May 1997)
- Faculty Excellence in Teaching Awards (*METU*), 1993, 1999, and 2000 (an award of 3,000 USD each + certificate)
- Max Planck Society, *visiting professor* scholarship (Feb 1999 to Feb 2001)
- Turkish Academy of Sciences, *Associate member* (Apr 2000 to Apr 2009)

Student Advising/Mentoring

- 10 graduate theses supervised & completed (5 at [METU-Turkey](#), 5 at [Clemson University-USA](#)),
- 28 senior capstone projects; supervised, completed and published (after a successful jury defense process by the students) in the form of an undergraduate thesis
- >35 undergraduate students were assigned laboratory experiments-based research projects

Product-on-the-market

“*Calcibon[®] Granules*”: Micro- and macro-porous apatitic, bone-like calcium phosphate spherical granules (1 to 6 mm in diameter) used for the clinical repair of bone defects since 2003 after they received an FDA approval. These have been the first porous granules ever produced “at room temperature by using a self-setting, orthopedic cement material.” Granules were first synthesized by A. C. Tas at the bench-scale *Merck Biomaterials GmbH* in Darmstadt, Germany, then scaled up to the industrial scale (in the presence and direct supervision of A. C. Tas) in a clean room of Merck Biomaterials (located at the time in Valence, France) and were then marketed by *Biomet Europe*. See: https://www.cuneyttas.com/Calcibon-GPS_2_protocol.pdf, US Patent [7,381,262](#) and *J. Mater. Sci. Mater. Med.*, 19, 2231-2239 (2008). The Calcibon Granules are for the sole use of orthopedic and oral surgeons (during surgical interventions on patients).

Links relevant to these granules: [1](#), [2](#), [3](#), [4](#), [5](#), [6](#), [7](#)

Product development: contributions to the technology of low C footprint and CO₂-sequestering materials

- World’s first CO₂-cured aerated concrete (*a.k.a.*, gasbeton, cellenbeton, lightweight concrete, porobeton, *etc.*) was developed, through the author’s direction and his hands-on work, which is hardened by using CO₂(g) and a non-hydraulic, low C footprint calcium silicate cement, without using any water vapor (=steam), in a CO₂-curing chamber running at 90°C and at 1 atm chamber pressure in less than 12 hours to have 5.3±0.2 MPa compressive strength at the density of 550±8 kg/m³ (=0.55 g/cm³), originating from a monobloc pre-cured foam having the dimensions of 1100 mm x 700 mm x 700 mm, followed by wire-cutting this large monobloc pre-cured foam into 60 mm-thick panels or 200 mm-thick masonry blocks prior to entering a CO₂-curing chamber of the novel design of A. C. Tas. This unique manufacturing technique reached the TRL-6 level (issued US patents: 11,767,264 B2 / 11,667,573 B2 / 11,352,297 B2 / 11,518,715 B2), used Stage Gate
- A unique CO₂-curing chamber (having a vertical bottom-up flow (VBUF) pattern) designed by the author himself (patent application: [WO 2020/046927 A1](#)) was able to CO₂-cure (at 1 atm pressure) Portland cement-free concrete pavers and blocks to compressive strengths in excess of 11,000 psi in only about 6 hours. The CO₂-curing of such Portland cement-free

concrete pavers and blocks are demonstrated at large industrial scales at a commercial, well-established paver production company of North America. In the TRL-6 prototype trials green (uncured) palletized paver cubes (each consisting of 480 or so pavers (with the dimensions of 100x200x80 mm)) were placed in the above-mentioned CO₂-curing chamber. Such high compressive strengths cannot be reached in Portland cement-based pavers or blocks in such short times of curing. While the palletizing of individual pavers into paver cubes are at the very end of the conventional OPC paver/block production process flowcharts; the author happened to be the pioneer to first palletize the green non-OPC pavers (thanks to the author's novel inorganic additive chemistry touch incorporated into the pre-curing stage that comes before the palletizing into a cube) and then place them into the CO₂-curing chamber of the author's unique VBUF design. The tight packing of hundreds of pavers in each of such industrial size large paver cubes made the uniform moisture level attainment inside the paver cubes possible; used Stage Gate and Agile methodologies.

- The conventional and extensively studied supplementary cementitious materials (SCMs) are mainly comprised of fly ash, blast furnace or steel slags, calcined clays and natural pozzolans (such as pumice and perlite) according to the ASTM C1709 standard. Such SCMs essentially function on and around the simple principle that when these SCM powders (of the proper particle shape distribution, particle size distribution and BET surface area) are mixed in to a concrete mix design at the level of 20 to 45% OPC replacement, they do not degrade much the concrete performance and its long-term durability. Any percentage (from 20 to 45%) of such an ordinary SCM successfully added to a concrete mix design automatically reduce the CO₂ emissions caused by the cement kiln production of OPC (excluding the greenhouse gas (GHG) emissions resulting from the fossil fuel use in the burners of cement kilns). The author and his co-workers demonstrated and produced a novel SCM that contains amorphous silica, which was produced by either wet or semi-wet carbonation processing of a Portland cement-free calcium silicate powder, and that SCM was shown to be able to replace 35% of Portland cement (PLC - type IL cement) in the ready mix concrete batches; US Patent applications: 2023/0382792 A1 and 2023/0023151 A1, used Stage Gate.

Contributions to the carbonate-containing material systems and inorganic biomaterials

- Urea decomposition, catalyzed by its enzyme urease, is a well-regulated (*in terms of supply*) and homogeneous source of HCO₃⁻ ions in a diverse set of materials synthesis processes. We have used this method to produce [Y\(Cr, Co\)O₃](#), [LaAlO₃](#), [Pb\(Zr_{0.52}Ti_{0.48}\)O₃](#), Gd-doped [CaZrO₃](#), Sr- and Zn-doped [LaGaO₃](#), [GaO\(OH\)](#), Mn-doped [ZnGa₂O₄](#) (Patent No: [EP 1 227 139](#)), [CaCO₃](#), and “biomimetic” calcium phosphates.
- Carbonate ion-containing [synthetic body fluids](#) (SBF), mimicking the blood plasma in terms of ion concentrations, can *in situ* form nanosize calcium phosphate (*CaP*) particles. Author has developed a *Tris*-buffered SBF solution back in [1999](#) with a HCO₃⁻ concentration (*i.e.*, 27 mM) exactly equal to that of human blood plasma. Developed “10xSBF” solution ([2004](#)) for “[coating](#)” bioinert ceramics, polymers, or metals with an apatitic *CaP* layer to make their surfaces more osteoinductive.
- Synthesized carbonated nanopowders (*in bulk quantities*) of calcium phosphate bioceramics by using an SBF solution ([2000](#)) and/or enzyme-catalyzed biomimetic synthesis at 37°C ([2001](#))

- DMEM cell culture solutions, instead of SBF, to modify the surfaces of CaP biomaterials and titanium ([2010](#) and [2014](#))
- Developed a novel *Tris*- or *Hepes*-free SBF solution by using Na-lactate and lactic acid pair (*Lac*-SBF) ([2010](#) and [2012](#))
- Biphasic calcium phosphate synthesis by aqueous routes; a first-of-its-kind study ([1998](#))
- Developed tape-casting slurry recipes for the production of mm-thick tapes (that did not warp or crack upon sintering at 1250°C) of bioactive calcium phosphates ([1998](#))
- Developed novel methods for the production of macroporous, synthetic bone substitutes ([1999](#), [2000](#), [2004](#))
- Developed a method for the dip-coating of titanium or stainless steel coupons with bioactive calcium phosphates ([2000](#))
- Calcium hydroxyapatite powders of high thermal stability ([2000](#) and a [M.Sc. thesis](#) proposed and supervised), which did not decompose to β -TCP even at 1500°C
- Developed three different methods of synthesizing whiskers (*i.e.*, *single crystals*) of calcium phosphate (*either β -TCP or hydroxyapatite*) biomaterials at <100°C or at 1200°C ([2001](#) & [2007](#) & [2004](#))
- Developed various self-setting, self-hardening (hydraulic) cements for surgical bone defect repair: [1] ([2005](#)), [2] Patent No's: US [6,929,692](#) & US [7,381,262](#) and [3] ([2007](#))
- World's first [monetite \(CaHPO₄\) cement](#) was produced from Ca(OH)₂ powder and phosphoric acid ([2005](#))
- Synthesized “[biconvex micropills](#)” of vaterite CaCO₃ ([2009](#)). Such monodisperse, non-agglomerated micropills, in any material system, were not possible to produce prior to this work (US Patent No: [8,470,280](#))
- [Rhenanite](#) (NaCaPO₄)-apatite biphasics
- Synthesized “dumbbell-shaped” brushite (CaHPO₄·2H₂O) crystals ([2010](#)) and brushite micro-granules ([2012](#))
- “Calcium metal” to synthesize amorphous calcium phosphate ([2012](#)) US patent [9,108,860](#), which protects, through its Claim-1, the composition of SBF-like solutions (*SBF = simulated or synthetic body fluid*)

- Synthesized, for the first time, monodisperse amorphous calcium phosphate (ACP) nanospheres in DMEM-like ([2013](#)) or synthetic body fluid (*Lac-SBF*) solutions ([2014](#))
- The very first synthesis of nano-calcium phosphate having a BET surface area of 900 m²/g ([2014](#))
- Aragonite is highly reactive in *Lac-SBF* solutions ([2014](#))
- Developed novel “aragonite coating solutions” (ACS) similar to the composition of seawater ([2015](#))
- Whitlockite synthesis from brushite ([2016](#))
- Transformation of natural marble (calcite) to apatitic calcium phosphate ([2005](#))
- Developed a simple aqueous and carbonated solution that coats only brushite onto Ti-6Al-4V alloy surfaces at RT ([2006](#))
- Calcium “carbosilicates” (the very first “naming” of a number of compounds, [2025](#))
- Synthesis and use of “calcium bicarbonate” (Ca(HCO₃)₂) solutions in green cement+concrete ([2025](#))
- “Magnesian calcite” globules of a sea star ([2025](#))
- Hydrated, crystalline forms of CaCO₃: Monohydrocalcite and Ikaite ([2025](#))
- TGA data of two commercial calcite powders and of [vaterite micropills](#) synthesized by the author ([2025](#))
- Akermanite (Ca₂Mg(Si₂O₇)), gehlenite (Ca₂Al(AlSiO₇)) and solid solutions between the two ([2025](#))
- Amorphous calcium carbonate, ACC ([2026](#))
- Amorphous magnesium carbonate, AMC ([2026](#))
- How to synthesize apatitic calcium phosphate, Ap-Cap? ([2026](#))
- Alkali ion (Na⁺ or K⁺) incorporation into the crystal structure of CaCO₃ ([2026](#))