Program	**NUCLEU PN 09-13 03 10**
Project title (ENG):	**Biotechnological solution for high organic load municipal/industrial wastewater treatment based on aerobic granular sludge systems**
Project title (RO):	**Solutii biotehnologice de epurare a apelor uzate menajere/industriale cu incarcari organice ridicate utilizand sisteme cu namol activ aerob granular**
Duration	2009-2014
Team Leader	Costel Bumbac
Summary (short description) ENG	Wastewater treatment technology based on aerobic granular activated sludge SBR systems for high organic load wastewaters. Scope: wastewater treatment plants (especially for industrial wastewater with high organic load). Overview: Experiments have shown that the formation of granular sludge under aerobic conditions is possible and seems a promising technique for wastewater with high organic load and / or potentially toxic substances. The granule size is in close correlation with the size of the anoxic area and thus directly proportional to the intensity of anoxic/anaerobic processes. The aerobic granular sludge obtained proved adaptability and stability in terms of high pollutant concentrations removal, successfully removing, in less than 8 hours concentrations of up to 3 g /L of phenol and overall organic load in the reactor. Aerobic granular sludge microbial structure is dense and strong, as defined, smooth, regular and clear outer surface; The granules are visible as separate entities in the mixed solution, both in the mixing and settling stage; The system has a high capacity of biomass retention and tailing; It is able to withstand high flow rates; can withstand high organic loading rate; It is less vulnerable to the toxic organic compounds from wastewater than the sludge in suspension. Excellent settling ability simplifies the separation of the treated effluent from the aerobic granular sludge. By the application of correct hydrodynamic selection factors, the biomass from an aerobic sequentially batch reactor (SBR), has succeeded in the development of aggregates of microbial origin with a granular structure which has turned out effective and stable in treating wastewaters with high shock loading and toxic substrate (phenol) .
Summary (short description) RO	Tehnologie de epurare a apelor uzate cu incarcari organice ridicate utilizand sisteme secventiale cu namol activ aerob granular Domeniu de aplicabilitate: Statii de epurare a apelor uzate .(in special ape uzate industriale cu incarcari organice ridicate) Prezentare generala : Experimentele au aratat ca formarea namolului granular in conditii aerobe este posibila si pare o tehnica promitatoare de epurare a apelor uzate cu incarcare organica ridicata si/sau potential toxica. Dimensiunea granulelor este in stransa legtura cu dimensiunea zonei anoxice a acestora si implicit direct proportional cu intensitatea proceselor anoxice anaerobe in sistemul AGSBR. Namolul aerob granular obtinut a dovedit adaptabilitate si stabilitate avand in vedere concenttratiile ridicate de poluant, reusind sa indeparteze cu eficienta ridicata, in mai putin de 8 ore concentratii de pana la 3 g/l de fenol si incarcarea organica globala a reactorului. Namolul granular aerob are structura microbiana densa si puternica, forma definita, neteda, regulata si suprafata exterioara clara; granulele sunt vizibile ca entitati separate in solutii mixte atat in faza de amestecare cat si in cea de decantare; are o capacitate mare de retentie a biomasei si de decantare; este capabil de a rezista la debite mari; sa

	poata rezista la rate de incarcare organice mari; este mai putin vulnerabil la compusii organici toxici din apele uzate decat namolul in suspensie. Capacitatea excelenta de decantare a granulelor aerobe simplifica separarea efluentului tratat din namolul granular. Prin aplicarea unui regim de alimentare si selectie corect asupra biomasei dintr-un reactor secvential aerob (SBR), s-a reusit dezvoltarea unor agregate microbiene cu structura granulara ce au dovedit ulterior eficiente de epurare ridicate si stabilitate la socuri de incarcare si substrat toxic (fenol).
Dissemination of results	
Full-paper ISI	Bumbac, C.; Ionescu, I. A.; Tiron, O.; et al.; Continuous flow aerobic granular sludge reactor for dairy wastewater treatment; WATER SCIENCE AND TECHNOLOGY Volume: 71 Issue: 3 Pages: 440-445 Published: 2015.
Full-paper BDI	Bumbac Costel, Ionescu Ioana Alexandra, Tricolici Olga, Aerobic granular sludge vs. conventional wastewater treatment technology, ROMAQUA, nr.1 (2014), p.21-25, 2014, ISSN 1453-6986.
Conferences (platform, poster, abstract / full-paper)	Bumbac C., Popescu A., Dobre D., Pena Leonte E., Ghita I., Formation of aerobic granular sludge - recent advances and experimental studies, International Symposium "The Environment and Industry" 2009 Conference Proceedings, volume I, ISSN 1843-5831, 132-139
	Bumbac C., Dinu R. L., Popescu A. M., Pena-Leonte E., Phenol rich wastewater treatment using an aerobic granular sludge SBR, Development of the water supply and sewerage systems in the rural communities, 2010, ARA Scientific and Technical Conference
	Bumbac C., Popescu A., Dinu L., Pena Leonte E., Aerobic granular sludge: a modern alternative for advanced wastewater treatment, B.EN.A. International Workshop "Global And Regional Environmental Protection" GLOREP 2010, Timisoara
	Bumbac, C.; Dinu, R.L.; Patroescu, V.I.; Evaluation of Aerobic Granular Sludge SBR Performances, 1st Danube – Black Sea Regional Young Water Professionals Conference "Innovations in the field of water supply, sanitation and water quality", 14 – 15 iunie 2011, Bucharest
	Bumbac, C., Dinu, L., Dobre, D., Pena-Leonte, E., Popescu, Aerobic Granular Sludge SBR Limits And Performances, SIMI 2011 - International Symposium „Environment and Industry", 2011, Bucharest
	Bumbac C., Ionescu I. A., Tricolici O, Aerobic granular sludge vs. conventional wastewater treatment technology, Workshop IWA-YWP « Innovative technologies for wastewater treatment » SIMI 2013 - International Symposium „Environment and Industry" 2013, Bucuresti
	Ionescu I. A., Bumbac C., Tricolici O, Formation of aerobic granules in sequencing batch reactor treating dairy industry wastewater, Workshop IWA-YWP « Innovative technologies for wastewater treatment » SIMI 2013 - International Symposium „Environment and Industry" 2013, Bucuresti
	Bumbac C., Ionescu I., Tiron O., Badescu V., Aerobic Granular Sludge Continuous Flow Reactor for Dairy Wastewater Treatment, IWA 6th Eastern European Young Water Professionals Conference - Istanbul 2014