

<b>Program</b>	<b>Program NUCLEU PN 09-13 03 16</b>
<b>Project title (ENG):</b>	<b>Advanced removal of organic micro pollutants and microbial load from aqueous systems by sonolysis coupled with classical AOPs processes</b>
<b>Project title (RO):</b>	<b>Indeprtarea avansata a micropoluantilor organici si incarcarii microbiene din sisteme apoase prin procese sonochimice cuplate cu procese APOs clasice</b>
<b>Duration</b>	2014-2015
<b>Team Leader</b>	Mihai STEFANESCU
<b>Summary</b> (short description) ENG	<p>Research activity of the project led to selection of some flow treatment phases for drinking water surface sources which contain ultrasound application for removal of natural organic matter, trihalomethanes generated in the chlorination phase, ammonia ions, sulphides and manganese and for diminishing of chlorine amount using ultrasound for partial disinfection.</p> <p>The correlation of experimental results prove that is possible advanced removal of natural organic matter (NOM) – 60 – 90% by sonolysis with iron catalyst and of specific organic matter (THMs) – 95% by hybrid sonolysis US/H<sub>2</sub>O<sub>2</sub>/UV. Disinfection tests of drinking water by direct sonolysis show the diminishing of mesophilic bacteria content with one order and inactivation efficiency was 96%.</p> <p>In case of inorganic micropollutants (ammonia, sulphides, manganese) coupling of sonolysis with chlorination (to small chlorine doses - stoichiometric amount) led to ammonia removal with 60 – 70% efficiency and experimental tests of hybrid sonolysis US + H<sub>2</sub>O<sub>2</sub> (stoichiometric dose of peroxide) for sulphides removal from drinking water (≤ 10 mg S<sub>2</sub>/l) demonstrated the possibility to remove them with 75% efficiency for 30 minutes reaction time. Maximum removal efficiency of manganese from water was 65% in case of hybrid treatment system (US + H<sub>2</sub>O<sub>2</sub> + Fe).</p> <p>These results of laboratory scale show that sonolysis can be effectively integrated in the classical treatment flows of drinking water after adaptation to specific quality conditions of water source and to present treatment flow.</p>
<b>Summary</b> (short description) RO	<p>Lucrarile de cercetare efectuate in cadrul proiectului au condus la selectarea unor secvente de flux de tratare a surselor de apa potabila de suprafata care includ utilizarea ultrasunetelor pentru indepartarea materiei organice naturale, a trihalometanilor formati in procesul de clorinare, a ionilor amoniu, sulfurilor, si manganului precum si pentru reducerea cantitatii de clor prin dezinfectia partiala cu radiatie ultrasonica.</p> <p>Corelarea rezultatelor experimentale au demonstrat ca este posibila indepartarea avansata a materiei organice naturale (MON) - 60-90% prin sonoliza cu catalizator de fier si a incarcarii organice specifice (THM) - 95% in sonoliza hibrida US/H<sub>2</sub>O<sub>2</sub>/UV. Testele de dezinfectie a apei potabile prin sonoliza directa au aratat scaderea cu un ordin de marime a indicatorului bacterii mezofile aerobe randamentul de inactivare fiind de 96%.</p> <p>In cazul micropoluantilor de natura anorganica (amoniu, sulfuri, mangan) cuplarea sonolizei cu clorinarea (la doze mici de clor egale cu necesarul stoechiometric) a condus la indepartarea ionilor amoniu cu randamente de 60-70% iar experimentele de sonoliza hibrida in sistem US + H<sub>2</sub>O<sub>2</sub> (doza stoechiometrica de peroxid) pentru indepartarea sulfurilor din apa potabila (≤ 10 mg S<sub>2</sub>/l) au demonstrat posibilitatea indepartarii acestora cu o eficienta de 75% pentru 30 de minute de reactie. Randamentul maxim de indepartare a manganului din apa a fost de 65% pentru sistemul hibrid de sonoliza US + H<sub>2</sub>O<sub>2</sub> + Fe.</p> <p>Aceste rezultate la nivel laborator arata ca sonoliza poate fi integrata eficient in fluxurile clasice de potabilizare dupa adaptare la conditiile specifice de calitate a sursei de apa si fluxului de tratare existent.</p>

<b>Dissemination of results</b>	
Full-paper ISI	<b>Stefanescu M.</b> , Badescu V., Cosma C., Removal of Manganese Content from Synthetic Aqueous Solution and Groundwater Using Direct Sonolysis/Hybrid Sonolysis, <i>Revista de Chimie</i> , , <b>2016</b> , 67, no.8, 1458 - 1461
Conferences (platform, poster, abstract / full-paper)	<b>Stefanescu M.</b> , Cosma C., Cristea I., Ionescu I., Bumbac C., Degradation of natural organic matter from surface water using sonolyse, <i>Simpozion ECOIND "Mediul si Industria"</i> , <b>2015</b> , Bucuresti