2nd World Congress and Expo on
Nanotechnology and Material Science
April 04-06, 2016 at Dubai, UAE

Inorganic Coagulant for Nano-size Contaminants: Semiconductors as Case Studies

Ahmed H. A. Dabwan
Faculty of Chemical Engineering Technology, TATI University College, Malaysia

In many parts of the world, silica is the major constituent of sand. Silica is one of the most complex and most abundant families of materials, existing both as several minerals and being produced synthetically. Notable examples include quartz, crystal, fumed silica, silica gel, and aero gels. Applications range from structural materials to microelectronics to components used in the food industry.

Silica exposure remains a serious threat to nearly 2 million U.S. workers, including more than 100,000 workers in high risk jobs such as abrasive blasting, foundry work, stonecutting, rock drilling, quarry work and tunneling. Crystalline silica has been classified as a human lung carcinogen. Additionally, breathing crystalline silica dust can cause **silicosis**, which in severe cases can be disabling, or even fatal. The respirable silica dust enters the lungs and causes the formation of scar tissues, thus reducing the lungs' ability to take in oxygen. There is no cure for silicosis. Since silicosis affects lung function, it makes one more susceptible to lung infections like **tuberculosis**. In addition, smoking causes lung damage and adds to the damage caused by breathing silica dust. in water supply, silica can exist in a dissolved, particulate or colloidal form. A colloid is a very fine suspended particle which does not settle readily. In high enough concentrations, silica has a tendency to form scale deposits. This is especially true in high temperature boiler applications and in the power generation field where silica can deposit on turbine heads. Treatment for silica depends on the form it's in. In the particulate form, silica can be removed by simple filtration. The colloidal form may require chemical addition such as magnesium salts followed by filtration or reverse osmosis (RO). In the dissolved form, RO and anion exchange work well, however anion exchange is not generally practiced in domestic applications as it requires caustic soda to strip the silica back off. Needless to say, silica removal is not as easy as it appears.

As contribution to solve the mentioned problems in industrial wastewater, coagulation and flocculation experiments were carried out to assess the ability of coagulant made mainly from paper sludge ashes (PSA) for the removal of high concentration colloidal silica wastes from microelectronics industry. Three different parameters were checked, pH, coagulant dosage, and temperature. High removal efficiency was obtained when pH was higher than 8, therefore no need to adjust pH before treatment since waste is produced with high pH values. The optimum coagulant dosage was 0.25 g of PSA per 1gram of silica at concentration of 1.8% colloidal silica. Temperature was carried out under mild conditions from (10-40 ^{o}C). Increasing the coagulant dose at 10 ^{o}C or lower could help to achieve clear effluent. Long-term operating data were gathered by using continuous flow system for treatment actual wastes. Average results obtained for the fluent for TN, TP, T. Si, COD, BOD and S.S were 11, < 1, < 50, 10, 12 < 50PPM, 16 PPM, and <100 PPM respectively which are comply with the most international environmental regulations.

Biography:

Dr. Ahmed obtained his Bachelor degree in Chemical Engineering from King Saud University, Riyadh, Saudi Arabia, his Master (2001), and Ph. D. (2004) from Graduate School of Engineering, Mie University, Japan. Dr. Ahmed was appointed as a full time research in Mie Industry and Enterprise Support Center (MIESC), Japan from (4/2005 – 6/2007). Full time researcher in Anotsu Research Institute for Environmental Restoration (ARIER), Mie, Japan from 7/2007- 4/2009). From 5/2009 joined TATI University College, Terengganu, Malaysia as a lecturer, became the Dean of Chemical Engineering Technology, at the same university from 8/2012 to 2/2013. From 3/2013 till 12/2014; he was promoted as the Dean of Research Management Centre (RMC), in the same university. Currently he is a Senior Lecturer in the Department of Chemical Engineering Technology, TATI University College supervising students final year projects and monitoring different research grants. Besides his research and academic activities including publications, funded projects, supervision of postgraduate students and undergraduate projects, he is also an accomplished expert in the sustainability, industrial wastes, and wastewater treatment processes, carbon dioxide chemistry, fuel production, analytical atomic spectrometry, pollution prevention, physical-chemical treatment. Moreover, he has received prestigious scholarships and awards such as; awarded the Japanese government (MEXT, scholarship 1998-2004), Japan Society for the Promotion of Science fellow (JSPS June 2011-March 2012). In Malaysia awarded different medals in national and international levels such as ITEX, MTE, and PECIPTA for his significant contribution to cleaner environment.