Alumina Production Research at CSIRO

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Research into the refining of bauxite to alumina is conducted by the CSIRO Hydrometallurgy group mainly based in Perth, Western Australia with additional engineering expertise based in Clayton, Victoria. In total, about 15 full time researchers are involved in Alumina Production research.

There are two sub-groups in Perth, concentrating on the “Red side” and “White side” issues of the Bayer process. These are supported by a solid/liquid separation group and a process engineering group, the latter specialising in aspects of slurry flow in vessels and pipes. Our engagement mechanisms with government and Industry are of four types:

- **Strategic** – funded by the government or through quasi-government sources, generally for National Priority issues related to the Industry. Note that due to a decline in real funding, these activities have, and will continue to shrink in coming years.

- **Precompetitive** – Large projects. Often conducted over multiple years, and with several Industrial sponsors, on topics of general and common interest to the Industry. These projects may also involve other research providers outside of CSIRO, and are sometimes brokered through organisations such as AMIRA.

- **Collaborative** – Generally 1:1 projects conducted with a single Industrial sponsor. Costs and outcomes are shared, and the work is confidential to the sponsor.

- **Consultative** – Where the outcomes of the project (especially IP) are retained by the sponsor, and the work is performed strictly “commercial-in-confidence. Full cost (or above) is born by the sponsor.

Bayer Redside projects at CSIRO include: (i) bauxite characterisation and “processibility” studies to underpin greenfield bankable feasibility studies and brownfield expansions (ii) impurity control, especially liquor organics mitigation by wet oxidation (iii) residue studies including trace metal deportment and a database for comparing existing storage technologies.

Bayer Whiteside projects at CSIRO include: (i) fundamental studies of gibbsite precipitation including the development of kinetic parameters for nucleation, agglomeration and growth (ii) the influence of oxalate co-precipitation on gibbsite precipitation (iii) calcination models to describe the transformation of gibbsite to smelter grade alumina (iv) the strength of smelter grade alumina and its relation to gibbsite precipitation parameters.

The solid-liquid separation group have conducted kinetic studies of flocculation in the flowing regions of a feedwell, examined the shape and density of aggregates and their relation to hindered settling, as well as issues of bed compaction and rake action. They currently have full CFD model which includes aspects of these studies to describe the full action of a working thickener. The engineering group have looked at vessel design, especially digesters, as well as mixing of slurries in predesilication and the development of innovative precipitator agitators (Swirl Flow Technology).
Biography of Presenter

Dr Peter Smith

Dr. Peter Smith is a stream leader within CSIRO’s Minerals Down Under flagship. He currently leads a team of 10 professionals engaged in Alumina Production research. Peter has a 25 year history with the Alumina industry and has worked with all of the Australian and most of the world’s Alumina producers. Peter has also supervised many students from undergraduate up to PhD level over this period. Peter is a regular contributor to Alumina production forums including TMS Light Metals, AQW and ICSOBA, for which he is a Council member.