

## Poster Presentation

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### *The solvent effect on the crystal morphology of two tegafur polymorphs*

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Pharmaceutical compounds are mostly produced in defined crystalline forms that are usually crystallized from solutions. Polymorphs, different crystalline phases of the same pharmaceutical compound, usually have different, precisely known dissolution rates and bioavailability, but crystal size and shape can affect these properties. Therefore, the crystal shape is monitored during the drug manufacturing process and a lot of work in the area of crystal engineering has been devoted to crystal habit control [1]. The crystallization solvent can have a significant effect on the resulting crystal shape; therefore solvent effect on crystal habit needs comprehensive studies. The compound studied in this research – tegafur (5-fluoro-1-(tetrahydro-2-furyl)-uracil) – is an antitumor agent, known to exist in  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  and  $\epsilon$  polymorphs [2, 3]. Single crystal X-ray diffraction (SC XRD) was used to index crystal faces of  $\alpha$  and  $\beta$  tegafur crystals grown in different solvents and molecular dynamics (MD) simulation was used as a tool to estimate the crystal face growth rates in several solvents. SC XRD results indicated that {011} and {110} faces dominated in  $\beta$  tegafur crystals when crystallized from ethanol, methanol, butyl acetate, tetrahydrofuran, whereas  $\alpha$  tegafur crystals had a dominant {001}, {010} and {011} faces when crystallized from these solvents. Crystals grown in acetone had a different dominant faces for both polymorphs. The interaction between the solvents and each tegafur face was different, but the order of binding energy on these surfaces remained the same and was {011} > {110} > {010} for  $\beta$  tegafur and {001} > {011} > {010} for  $\alpha$  tegafur. The analysis of MD data revealed that the system's primary interactions are weak hydrogen bonds. The achieved predictions were in agreement with experimental results. This work has been supported by the European Social Fund within the project «Support for Doctoral Studies at University of Latvia».

[1] I. Weissbuch et al., *Acta Crystallogr. Sect. B*, 1995, 51, 115–148., [2] T. Uchida et al., *Chem. Pharm. Bull.* 1993, 41, 1632–1635., [3] A. Actiņš et al., *Latv. J. Chem.* 2006, 2, 120–124.

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