Abstract. The normalized eigenvalues $\Lambda_i(M, g)$ of the Laplace-Beltrami operator can be considered as functionals on the space of all Riemannian metrics $g$ on a fixed surface $M$. In recent papers several explicit examples of extremal metrics were provided. These metrics are induced by minimal immersions of surfaces in $S^3$ or $S^4$. In the present paper a family of extremal metrics induced by minimal immersions in $S^5$ is investigated.