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Everywhere regularity of certain nonlinear systems

I will talk about nonlinear parabolic systems that are generalizations of scalar diffusion equations. More precisely, I consider systems of the form

$$\mathbf{u}_t - \Delta[\nabla\Phi(\mathbf{u})] = 0,$$

where $\Phi(z)$ is a strictly convex function. I will show that when Φ is a function only of the norm of $\mathbf{u}$, then bounded weak solutions of these parabolic systems are everywhere Hölder continuous and thus everywhere smooth. I will also show that the method used to prove this result can be easily adopted to simplify the proof of the result due to Wiegner on everywhere regularity of bounded weak solutions of strongly coupled parabolic systems.